

# Midwest Engineer

SERVING THE ENGINEERING PROFESSION



GUSTAV EGLOFF  
THE IMPACT OF PETROLEUM  
ON OUR CIVILIZATION — PAGE THREE  
WSE MEETINGS — PAGE TWO

Vol. 8

MARCH, 1953

No. 10

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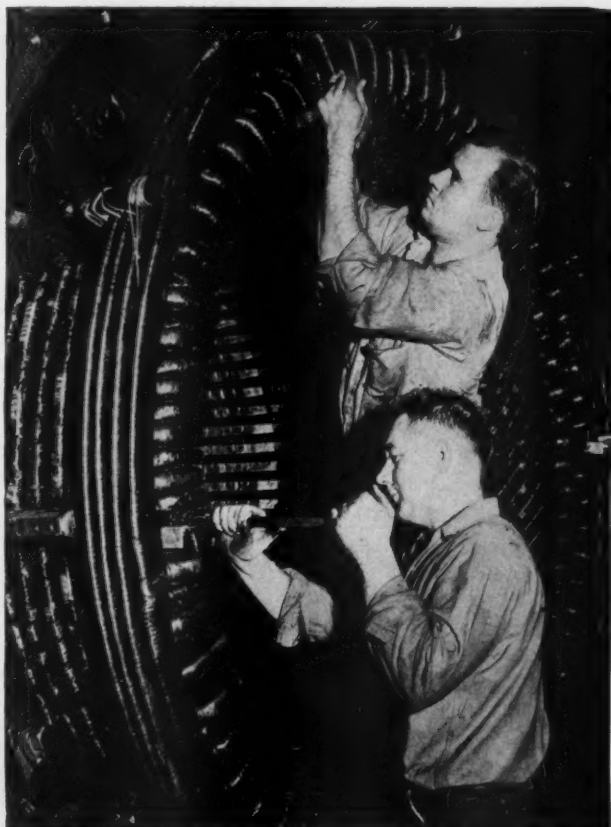
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### Cover Story

On our cover this issue is a picture of the recipient of the Washington Award for 1953, Dr. Gustav Egloff. He is Director of Research for Universal Oil Products Company. See pages 3 and 6 for other details.

—Photo by Fabian Bachrach



### **March 30, No Meeting Scheduled**

### **April 1, Noon Luncheon Meeting**

Speaker: Robert B. Dimmer, Automatic Electric Company, Chicago, Illinois.

Subject: "Transistors and their Applications."

Possibly no product has been developed in the physics laboratory recently that will have a greater economic impact on the nation than the invention of the transistor. Mr. Dimmer will discuss briefly the technical problems of the transistor, how it works, its limitations, and its applications.

### **April 2, Joint meeting with A.I.E.E.**

Speaker: Donald W. Haskins, Toll Planning Engineer, American Telephone and Telegraph Company.

Subject: "Nationwide Dialing."

This talk will include a discussion of the dialing system on trial in Englewood, New Jersey, where a party can phone a person in another city merely by dialing a number.

### **April 6, Gas, Fuels and Combustion Section**

Speaker: Ludwig Skog, Jr., Sargent and Lundy, Chicago.

Subject: "Pressurized Furnace Trends."

Mr. Skog will describe the development of pressurized furnace designs, and he will discuss details and advantages of wall design.

### **April 8, Noon Luncheon Meeting**

Speaker: Ben Dopke, Chicago.

Subject: "Soil Testing for Amateur Gardeners."

Mr. Dopke will discuss simple methods by which an amateur gardener can ascertain the condition of the soil for raising flowers, grass and vegetables. He will also have suggestions on ways to improve the soil.

### **April 13, General Meeting**

Speaker: Dr. A. Allan Bates, Portland Cement Association, Research and Development Division.

Subject: "New Developments in Concrete."

Dr. Bates will discuss the new methods of concrete construction which have been developed in the United States and other countries in recent years.

### **April 15, Noon Luncheon Meeting**

Speaker: To be announced.

Subject: To be announced.

### **April 20, Bridge and Structural Section**

Speaker: F. H. Dill, Welding Engineer, American Bridge Division, U. S. Steel Company, Ambridge, Pa.

Subject: "Welding Sequences and Some Uses of Heat in Structural Fabrication."

Mr. Dill will explain the general nature of shrinkages encountered in welding, and will discuss their effects.

Also he will outline what can be done to avoid accumulations of shrinkage and the stresses that accompany them.

His discussion of the uses of heat will explain how shrinkage developed by localized heating is used beneficially to straighten distorted pieces, or conversely, to produce desired curvature or camber in steel parts.

Slides will be used to illustrate Mr. Dill's talk.

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# The Impact of Petroleum on Our Civilization

By Dr. Gustav Egloff

Petroleum is essential to all phases of modern living. Our civilization would come to a stand-still without oil. Petroleum is not only our primary energy source but also the source of raw materials for about 5,000 different products. The industry has always been at the forefront in making new and improved products at a lower cost to the consuming public. It is our third largest industry with total investments of \$43 billion, and it employs over 2 million persons. Only agriculture with investments of \$170 billion and public utilities with \$52 billion are larger.

These gigantic proportions have been attained in the relatively short period of 94 years since the discovery of the Drake Well in 1859. The present magnitude of the petroleum industry is the result of its attitude toward investment and research. Since World War II, it has spent \$20 billion in expanding and improving its facilities, and plans to spend \$4 billion more during 1953. These expenditures enable the industry to meet all demands and keep pace with technical advancements in exploration and drilling equipment, refinery units and transportation facilities. Increasing amounts are required for many of its operations. For example, the cost of drilling a well has increased 200 per cent in the last five years. One of the principal reasons for increased cost is that the oil being discovered is at greater depths or otherwise less accessible than formerly. The willingness of the oil industry to invest in the future is perhaps more clearly illustrated by the cost of \$1,250,000 which is required for a single man-made island in the drilling of an offshore well in the Gulf of Mexico.

Despite the increasing costs which the industry encounters, it maintains gasoline prices at a much lower level than those of other commodities and at the same time, pays its workers high wages.

Dr. Gustav Egloff, Director of Research of Universal Oil Products Company, gave this talk at the annual Washington Award dinner in Chicago on February 23, 1953. At the dinner, Dr. Egloff was presented with the Washington Award plaque in honor of his signal contributions to the promotion of happiness, comfort and the well-being of humanity.

The price of gasoline, including taxes, has risen an average of about 45 per cent over the past thirteen years compared to about 85 per cent for all commodities.

The primary reason behind the ability of the petroleum industry to spend more without raising prices correspondingly is its extensive utilization of engineering and scientific manpower. It employs over 17,000 college trained engineers and scientists and spends over \$130 million per year on research. The inventions which result therefrom enable the industry to offer new and improved products and at the same time, keep costs down. Furthermore, the value of inventions stemming from petroleum research has extended far beyond the industry itself in the application of techniques and instruments to other industries. For example, the fluid technique for handling solids, which was developed in connection with the Fluid Flow Catalytic Cracking process, has been applied to a wide range of procedures such as the recovery of metal from low grade ores, the manufacture of phthalic anhydride, and the burning of limestone. Another illustration is the use of hydrogen fluoride as a catalyst in the alkylation process which is used for aviation gasoline components. Hydrogen fluoride has some violently corrosive properties which at first seemed to preclude its commercial use. The difficulties were overcome and thus all industry was provided with the know-how to use this substance.

The petroleum industry also increases the volume of business of other industries. As one illustration, the requirements for cracking catalysts are about 1,000,000 pounds per day, and when scheduled expansion is completed will reach about 1,400,000 pounds per day.

The ability of the industry to cope with the seemingly impossible has very frequently been evident during emergencies. The sudden need for unprecedented quantities of 100-octane aviation gasoline during World War II brought about rapid commercialization

of new processes. Even before Pearl Harbor, large volumes were supplied to the Allied nations. The greater power and maneuverability of planes fueled by 100-octane gasoline enabled British fighters to turn the tide of the Battle of Britain against the Nazi air armada which ran on 91-octane fuel. The high requirements for TNT and synthetic rubber were met by an almost over-night commercialization of processes that had been under study for production of toluene and butadiene. One of the most remarkable engineering achievements, the construction of the "Big Inch" pipeline, was another wartime challenge which the industry had to meet to insure the transportation of oil from the Gulf Coast to the East Coast as it was being cut off by submarine attacks on tankers. At the start of the Korean War, the United States was threatened with a crippling shortage of benzene which is basic to many kinds of plastics, synthetic rubber, nylon, detergents and other materials for both defense and civilian needs. Previously the entire production had come from coke ovens, the operation of which is tied to steel production. In the short space of time intervening, the petroleum industry has become a large scale producer of benzene and the shortage has been alleviated.

The petroleum industry enters into so many phases of our lives that only a few of its effects can be considered in detail. Petroleum (this term as used here and subsequently includes natural gas) is most important as a source of energy for transportation, heating, and industrial operation. Since World War I, it has been assuming the additional load imposed by our rapidly increasing energy requirements and has displaced coal as a primary source. During this period, coal production has been almost static at about 610 million tons per year. In contrast, petroleum production has increased over six times and natural gas five times. They now furnish 57 per cent of our energy requirements while coal

*(Continued on Page 4)*

*(Continued from Page 3)*

furnishes only 39 per cent and water power the remaining 4 per cent. Although the increase in automobiles, trucks, busses, and aircraft is a major factor in this shift in energy sources, the conversion from coal to oil in power generation and industrial and household heating and the replacement of coal burning locomotives by diesels have also been of great importance. These changes have brought about many benefits to consumers because of the greater convenience in handling, ease of control and cleanliness.

Gasoline is today the largest volume product of the industry but it has not always been. From 1859 to about 1915, kerosene was produced in greater quantities than gasoline. The revolution from a kerosene to a gasoline producing industry is one of the greatest achievements in our history and the one which has literally put America on wheels. When the automobile first came into use, 13 per cent was the maximum amount of gasoline obtainable by distillation of crude oil, the only refining process that had been developed. By 1910, there were 500,000 automobiles and progressively minded oil men began to realize that much greater quantities of gasoline would be needed than could be provided by merely increasing production of crude oil.

Petroleum researchers, however, were already at work on the gasoline problem, and in 1913, the first commercial cracking units went into operation. Improvements in cracking were soon forthcoming with the result that there has always been more than enough gasoline of sufficiently high quality to meet the requirements of our ever-increasing number of automobiles.

In the middle 1930's, catalytic processes began to come into commercial operation. The effect of these was to make much higher octane gasoline available and to increase quantities so that about 45 per cent of gasoline is now obtained from crude oil. The use of cracking processes makes unnecessary the production of about 2.5 billion barrels of oil per year which would otherwise be required. Increased yields of gasoline are not the sole factor in the conservation of oil. Improved quality results in increasing mileage. Two gallons of today's gasoline is equivalent to three gal-

lons of 1925 gasoline. In fact, the high compression auto engines of today could not even run on 1925 gasoline. Even greater savings will be made when the 12:1 compression ratio engines are in use and higher quality gasolines can be used. Road tests show that they get 40 per cent more miles per gallon than today's automobiles.

Likewise, modern aviation would not be possible without the high octane aviation gasoline which has resulted from continuous research and development. By use of new and improved processes, the industry produces gasolines which exceed the octane scale and a new scale of performance ratings has been set up. Although octane number is a major criterion in measuring the quality of gasoline, other factors are of high importance and continuous research relating to them is carried on.

Jet planes have posed new and entirely different problems from those associated with reciprocating engines. Initially, the jets required about five times as much fuel. This and other problems have been partially solved, but tailor-made fuels for jets can be expected.

Still different criteria of quality are encountered in diesel fuels and demand has been rising rapidly. One of the main reasons for the rise is that about 70 per cent of the total passenger and freight miles are now run by diesels. Another product for which demand has risen is light heating oil, used principally for household heating. Oil and natural gas heating have become very popular because of the advantages in cleanliness, easier regulation and less manual labor compared to coal. In 1935, coal furnished 80 per cent of the heat for buildings while oil and gas furnished only 19 per cent. In 1951, coal utilization had dropped to 43 per cent while oil and gas had risen to 54 per cent.

Other time-honored petroleum products include lubricants and waxes. The industry now makes over 1500 different lubricating oils and 430 greases. Although petroleum greases were used on the wheels of grandma's buggy and her apple jelly was sealed with paraffin wax, the petroleum waxes and lubricants of today encompass products for widely divergent purposes ranging from giant machines to tiny watches.

The petroleum industry, however, is now much more than a producer of mo-

tor and heating fuels and lubricants. It is the foundation for a vast new chemical industry. Starting as a by-product outlet about 30 years ago, petrochemicals have grown into a \$2 billion industry. At present, it is producing over 25 per cent of the total chemical requirements of the United States and will be producing 50 per cent of the total by 1962. The development of this industry has made possible greater quantities of old products and some entirely new products which add greatly to the convenience of living. The opportunities for the future in this field are limitless. With ample raw materials to depend upon, research can go forward to enhance the standard of living of the entire world.

Petrochemicals include many products for which demand is a billion pounds per year or more. They include both chemicals such as methanol which were formerly produced entirely from other sources and those such as isopropyl alcohol which have been made possible only by utilization of petroleum as raw material. Methanol is commonly known as "wood alcohol" but many years have passed since it was actually derived from wood and natural gas is now the chief raw material. The principal use of isopropyl alcohol is in the manufacture of acetone, another product once derived entirely from non-petroleum sources. These changes in raw materials are important not only because of lower costs but also because sufficient quantities of chemicals to meet present requirements could not be produced from the former source materials.

The end products which are now available from petrochemicals are revolutionizing many phases of our living. The most important of these are the chemicals used for plastics, synthetic rubber and textiles.

The plastics are replacing scarce metals, glass, ceramics, wood, natural fibers, leather, paper and other materials. In many cases, they are superior to the material which they replace, and very often are less costly. One of the most recent replacements in the metals field is the use of plastic pipe lines. They have the advantages of being flexible and resistant to corrosion, scale and rust, and having lighter weight. Another metal's replacement which will soon be in mass production is in auto bodies made from

*(Continued on Page 13)*



# THE NEXT STEP...

...IN THE DEVELOPMENT OF  
AN ENGINEERING AND  
SCIENCE HEADQUARTERS



has been taken by many of the members of WSE, and sizable funds have been received or pledged.

However, our goal has not yet been reached. We ask, therefore, "Has the second step been taken by you?"

Charles E. De Leuw,  
Chairman

D. Van Gorp  
B. A. Gordon  
G. L. Jackson  
Co-chairmen



LEFT: Dr. Gustav Egloff (on left) being presented the Washington Award plaque by Ovid W. Eshbach, President of The Western Society of Engineers.

## At the Washington Award Dinner

Coming from as far away as Europe, over 500 persons watched the presentation of the Washington Award plaque to Dr. Gustav Egloff, the 1953 recipient, at the Furniture Club of America on February 23. These 500 were attending the annual Washington Award dinner, "held to honor an engineer whose professional attainments have pre-eminently advanced the welfare of mankind."

At the speakers table were Ovid W. Eshbach, Dean of Engineering of the Northwestern Technological Institute; H. P. Sedwick, President, Public Service Company of Northern Illinois and Acting Chairman of the Washington Award Commission in the absence of James D. Cunningham, Chairman; and Dr. Egloff. Also at the speakers table were the officially designated representatives of the participating organizations. Dr. J. T. Rettaliata, President, Illinois Institute of Technology, represented the American Society of Mechanical Engineers. Representing the American Society of Civil Engineers was C. Donald Kennedy, Director of Research, Portland Cement Association. The American Institute of Electrical Engineers was represented by Noah C. Percy, of Pioneer Service



ABOVE, left to right, G. Donald Kennedy, N. C. Percy, Ovid W. Eshbach and Dr. Gustav Egloff.



ABOVE, left to right, H. P. Sedwick, Hjalmer W. Johnson and Dr. John T. Rettaliata.

and Engineering Company. Dean Eshbach represented the Western Society of Engineers; and Hjalmer W. Johnson, Vice President of Inland Steel Company, represented the American Institute of Mining and Metallurgical Engineers.

Mr. Johnson, speaking for all the participating societies, expressed their concurrence in the Commission's selection of Dr. Egloff.

A reception was held in the East lounge of the Furniture Club preceding dinner. Following dinner, Mr. Sedwick opened the meeting. Some of his remarks follow:

"Mr. James D. Cunningham, Chairman of the Washington Award Commission for the year 1953, is out of the City, and is unable to attend this meeting. He asked me to act for him.

"The Washington Award was created by John W. Alvord in 1916. It was intended to promote 'a better appreciation by the public of able work accomplished by engineers for the public welfare, and, further, of encouraging among engineers themselves a broader understanding of their opportunities for public usefulness . . .' The award is made pursuant to recommendation of a Commission of Award composed of 17 members representing The American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Civil Engineers, and Western Society of Engineers. The Commission of Award, in addition to selecting the recipient of the award for the current year, each year approves, by majority vote, an eligible list of candidates for the next or subsequent Commissions. The Commission would like to have any nominees whom you may individually wish to submit. The initial award under the plan was made in 1919 to the Honorable Herbert Hoover, and subsequent awards have been made during most of the intervening years to the distinguished men shown on the list in your program.

"The Commission of Award for this year is listed in your program so I will not read their names.

"For the current year, the Commission again considered an eligible list that included many outstanding engineers and scientists. After the recipient of the award for this year was selected

by the Commission, each of the Engineering Societies was notified of the selection, and each sent a formal delegate to this meeting in token of its endorsement of the selection.

"The by-laws of the Washington Award Commission provide that the token of the Award be presented to the recipient by the President of Western Society of Engineers. It is now my pleasure to review for you and President Eshbach some of the reasons why Dr. Egloff is so eminently entitled to receive this award.

"I am sure that Dr. Gustav Egloff's many accomplishments are well known to most of you. Soon after receiving his Doctor's degree from Columbia University in 1916, Dr. Egloff became associated with Universal Oil Products Company, and from 1917 to date has been Director of Research and Petroleum Technologist for that organization. He has received many honorary degrees, and is a member of numerous societies, among them American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers and Western Society of Engineers. Dr. Egloff is a recognized authority on petroleum treatment, cracking processes, and other refinery processes for synthesizing hydrocarbon products. He has had about 300 patents granted by the United States and foreign countries, of which 'selective cracking' is one of his best known and important inventions. He is

the author of over 500 published articles relating to petroleum, coal, natural gas, and shale; and is also the author of many technical books. Dr. Egloff has participated in securing and administering research fellowships at several universities. He has been instrumental in arranging fellowships and promoting research and educational activities at Armour Institute of Technology and at Chicago, Northwestern, Harvard, Michigan, and Wisconsin Universities. He has served as a director of the Adult Education Society of Chicago. The President of the Polytechnic Institute of Brooklyn in conferring upon him the honorary degree, gave the following citation: 'For the brilliancy of your scientific achievements, for the vision of your economic application, and for the broad public benefits of your professional work, I confer upon you the degree of Doctor of Science with all its rights and privileges.'

"I would like to mention, as a very special mark of accomplishment, Doctor Egloff's extensive and valuable efforts in the interest of young engineers—citing only one of many such activities, the Young Engineers Forum of Western Society of Engineers, of which he has been chairman since its start."

At the end of his remarks, Mr. Sedwick introduced Dean Eshbach who presented the plaque with the following words:

Mr. Sedwick, the Western Society of  
(Continued on Page 14)



ABOVE, left to right, Dr. John F. Calvert, Mrs. Calvert, Dennis F. Clynes, an unidentified guest from England, Albert Reichmann, J. Earl Harrington, Dr. Gustav Egloff, H. P. Sedwick, Ovid W. Eshbach, and N. C. Pearcy.

# ***Your Pet Project***

## **MAY BECOME A PRIZE PAPER**



**Jot down the ideas you've had for a long time . . .**

**Maybe they'll help you think of others . . . Maybe they'll win you one of the five, \$100 prizes**

### **Here are the rules:**

Any member of the Society may compete regardless of grade of membership.

Papers shall not be highly technical in nature. A clear, concise and interesting coverage is desired rather than complex formulae or derivations. The subject discussed should be of general interest to engineers but should not be of a political or highly controversial nature.

All members of the Society who wish to submit papers in this contest should contact the Secretary as early as possible and not later than February 1, 1953, and request a copy of the rules governing the competition and an outline of the minimum requirements for acceptance of papers. These cover in detail the mechanical make-up which should be followed in preparing and submitting papers for the contest.

Papers must be submitted to the Secretary for acceptance by April 1, 1953. If the Secretary finds that they meet the minimum requirements of the contest, he will forward them to the Awards Committee for review. The papers will be identified by number only. The Secretary of the Society is the only person who will maintain the key to the authors.

If any paper does not comply with such minimum requirements, the Secretary will so advise

the author and discuss with him the points which are below the minimum requirements. The papers which are accepted will be forwarded to the Awards Committee for judging not later than May 1, 1953. Papers which have not met the minimum requirements by that time cannot be considered for prizes.

Papers which are accepted will be judged on originality of presentation, editorial merit and value to the engineering profession.

The papers submitted must not have been previously published in substantially the same form. No copyrighted materials shall be used unless permission has been obtained and so indicated. All manuscripts, drawings, etc., are to become the property of the Society and cannot be published without the consent of the Society.

If the papers submitted are NOT of sufficient merit to warrant the award of any or all of the prizes, the Awards Committee reserves the right to award less than the five established prizes or to postpone the competition.

The winners will be announced and the prizes presented at the annual meeting of the Society in June, 1953.

**WSE Executive Secretary will furnish you with a complete set of rules and minimum requirements on request.**

# The Big Steam Plant's Little Brother

By J. F. Griffin

The object here is to describe a small package type steam generator manufactured by Combustion Engineering-Superheater, Inc., for a very important portion of the industrial field which requires small quantities of steam, but where frequent outages cannot be tolerated and where overall economy in operation and maintenance is of the utmost importance. This field is entitled to the very best there is in steam generation engineering.

Fantastic monetary figures are involved in the steam generating field in the United States. Obviously, where such a tremendous amount of money is spent every year, there must be the maximum in efficiency and reliability, and this demands the very best in engineering.

Over twenty-two years ago, the so called "once-thru" boiler was improved upon by pumping more water through the boiler than would be evaporated into steam, and by then recirculating the excess water through the tubes. This feature was referred to as "forced circulation" and it was first introduced in Europe where it has been used quite extensively in thousands of small boilers. We choose to refer to this feature as "controlled circulation" or "controlled recirculation" to differentiate between it and the "once-thru" type boiler. A study of the results obtained in Europe led to Combustion Engineering's building two boilers having this feature. The first one was built 10 years ago for the Montaup Electric Company at Fall River, Mass. It was the first boiler in the power field in the United States having this feature and the largest boiler in the world having this feature. Its capacity is 600,000 lbs. of steam per hour with a design pressure of 2000 PSI and a steam temperature of 960 Deg. F. The second application of this feature in the United States was for the Koppers Company for the Synthetic Rubber Industry. It was built

during World War II. Although progress with this feature was delayed due to the war, the performance of the initial installations in the United States referred to has led to important progress since the war.

Since the war, Combustion Engineering has taken orders for 31 such boilers of various sizes for the power generating field. These boilers have a total capacity of over 31,700,000 lbs. per hour for generating over 4,600,000 K.W. The smallest of these boilers has a maximum steam output of 525,000 lbs. per hour and the largest has a maximum steam output of 1,650,000 lbs. per hour. The lowest design pressure in this group is 1650 PSI and the highest is 2600 PSI. The lowest steam temperature in the group is 1000 Deg. F. and the highest is 1100 Deg. F.

Two years ago, I read a report where 75% of all of the boilers built in Sweden since World War II had the controlled recirculation feature, which shows that this feature is still making progress in Europe.

The same engineering which has been applied to these boilers has been applied to their offspring, "The Big Steam Plant's Little Brother."

Getting back to the package type steam generator, I would like to point out to you that the first design was made for use on diesel locomotives to furnish steam for heating passenger cars, for cooking purposes in dining cars and for air-conditioning on those roads where the vapor system is used for air-conditioning. This application demands that we produce the maximum amount of steam possible within the very limited space available and that the weight be held to a minimum. It also demands a fully automatic steam generator with the greatest degree of reliability.

Space and weight limitations do not permit the use of a natural circulation boiler. A natural circulation water tube boiler as compared with the package type steam generator I am about to describe would occupy about twice the

floor space and would be about twice the height, which means about eight times the volume. Also, the natural circulation water tube boiler would weigh twice as much. A natural circulation fire tube boiler including the necessary water storage within it would be even larger and heavier than the natural circulation water tube boiler.

This situation makes it necessary to use what is usually referred to as a "flash" type steam generator. I would like to say a few words regarding the flash type steam generator at the risk of your considering this portion of the talk as being too elementary, but it will assist in leading up to the reasons for controlled recirculation. The class of so-called flash type steam generators might be broken down into three general groups. One of these is frequently referred to as the "once-thru" type. The steam generating surface of this group is usually made by using one continuous length of tubing formed in a coil. This produces what might be termed a single circuit or element.

All of the feedwater is pumped into one end of this tube. During its travel through the tube, it is completely generated into steam. The rate of flow of water thru this tube is only that which is provided by the feed pump and is equal by weight to the amount of steam being generated. Under light loads, the rate of flow may be very low. Obviously, since only steam and no water comes out the outlet end, there is no way of getting rid of sludge resulting from the internal chemical treatment or the dissolved solids in the water. This has the result that the scale-forming materials become deposited on the inside of the tubes. In some of the once-thru boilers the steam is actually superheated to various degrees in its last few feet of travel thru the tube. Because of there being no provision for getting rid of the scale forming properties in the water, I believe that no one attempts to use this type of boiler where they must operate with 100% makeup feed. This type of

(Continued on Page 10)

Mr. Griffin, Chief Engineer, East Chicago Division, Combustion Engineering-Superheater, Inc., gave this talk before the Western Society of Engineers at the Society's Headquarters on November 3, 1952.

(Continued from Page 9)

steam generator has been used in a closed cycle, where the steam, after having performed its work, is condensed and returned to the boiler as distilled water. But even with a closed cycle such as this, some makeup feed is necessary to take care of its losses due to leakage. The use of even a small amount of makeup feed, unless it is distilled water or the equivalent, causes scale formation in the tube. This scale will accumulate to the point where it must be removed by comparatively frequent acid washing.

A second type flash-type steam generator is frequently referred to as the "once-thru spillover" type. This is usually the same in general construction to the design just described. However, there is a difference in operation. In the latter, an excess of water over that generated into steam is pumped thru the steam generating tube, so that the outlet end of the tube discharges steam and water. The water which comes out of the tube with the steam is referred to as "spillover." This spillover provides a carrying agent for the suspended and dissolved solids to get them out of the steam generating tube in an effort to avoid scale formation in the tube. The spillover is usually discharged to a drain. The presence of water at the outlet of the tube also prevents the superheating of the steam. The amount of spillover varies with the make of equipment. I have heard of figures as low as 5% and as high as 100% spillover used with this single circuit arrangement. These percentages are in relation to the pounds of steam generated. With this type, as with the once-thru type, the rate of flow of water thru the tube is dependent on the feed pump and is equal only to the amount of steam being generated plus the spillover. Scale forming tests which will be commented on later showed that the rate of flow thru the tubes was not sufficient to prevent scale formation even though the water had internal chemical treatment.

The third of the flash-type steam generators is the one which is to be described in this talk. It is the "Controlled Re-Circulation" type.

This type of steam generator, instead of having a single circuit or element, as described for the previous two types, has a number of circuits or elements. A centrifugal circulating pump is used for

maintaining a constant rate of circulation thru the tubes. This rate of circulation is approximately ten times as great as the maximum steam output, which means that a high rate of water circulation is maintained regardless of whether the steam generator is operating at maximum capacity or at a low rate. The circulating pump is separate and distinct from the boiler feed pump. The latter is used to provide the necessary makeup feed to the steam generator.

Before the feature of recirculation was built in the steam generator, exhaustive scale forming tests were conducted with steam generating tubes to determine the minimum rate of flow of water that had to be provided through the tubes to prevent, for all practical purposes, scale formation in the tubes. The water used had what was considered suitable internal chemical treatment, and 100% makeup feed was used. A series of runs were made using a centrifugal pump for recirculating water thru steam generating tubes. During each run the following conditions were held consistent: the heat release in the furnace, the steam output and the boiler pressure. The feedwater before reaching the recirculating pump was heated to full boiler temperature by mixing live steam and boiler water with the feedwater. This is the same arrangement used in the steam generator.

For the test, thermocouples were embedded in the wall of the steam generating tubes on the fire side at various points through its length, and by means of a potentiometer, the tube metal temperatures were recorded at certain time intervals. Thus, the slightest amount of scale formation in the tubes could be readily detected. Some of the runs were of several days' duration, and established the necessity of a generous rate of circulation to prevent scale formation in the tubes. Also established was the fact that suitable water treatment was quite essential, and that the controlled recirculation principle by itself did not eliminate the necessity for proper water treatment. This point is important because there has been a considerable amount of misunderstanding regarding whether water treatment is necessary with controlled recirculation. It positively is necessary!

As a result of these tests, a rate of flow of water over 10 times the maximum steam output is used. In other

words, there is a minimum of ten times as much water by weight discharged from the outlet end of each steam generating tube as there is steam, during maximum steam output. This rate of flow provides a very generous factor of safety.

We are all well acquainted with the danger of burning out tubes when scale formation is heavy. I am not sure that there is a complete realization of the amount of capacity in steam output which is lost during the process of scale accumulation in tubes. This may be gradual prior to a burn out.

We know from experience with small steam generators that unless a generous rate of circulation is provided, there can be a tremendous falling off in capacity as scale forms in the tubes.

Scale formation has been tolerated with a flash type boiler only because it is very easy to remove by circulating an inhibited solution of hydrochloric acid through the tubes. Although this is a simple process for cleaning the boiler, it is far better to provide the necessary circulation to prevent the accumulation of scale, to reduce the danger of burn outs and to greatly increase the intervals between acid washings.

This circulating system, in addition to providing a means of preventing scale formation, or at least keeping it at a minimum, permits the design of a more compact unit as compared with a natural circulation boiler, because the circulating pump in providing the proper circulation thru the tubes allows the tubes to be bent into any form to suit the space available for its use.

Now we come to the question of reliability of operation, and I would like to repeat that the original application of the steam generator with controlled recirculation was for use on diesel locomotives. Regulations in the United States require that there be two men in the cab of the locomotive at all times, and if one of them has to leave the cab to go back into the compartment where the steam generator is located, these regulations call for the train to be brought to a stop. Those of you who are not connected with the railroads, although you may have been delayed many times on trains during your travels, may not be aware of the extent to which a ten minute delay of a passenger train on a 17 to 20 hour run is investigated by railroad officials. They

(Continued on Page 16)

# Zirconium—Metals' "Sleeping Beauty"

Just a laboratory curiosity only four years ago, zirconium—the "Sleeping Beauty" among the metals—has been awakened to play a vital role in the building of the first atomic engine for submarine propulsion.

Scientists of the Westinghouse Electric Corporation on March 7 revealed how this long-known but little-used metal has been brought into mass production, and how it is now linked with uranium in importance as a material for construction of a submarine "nuclear reactor."

When Westinghouse atomic scientists tackled the assignment of building the first submarine reactor, there was not enough usable zirconium to do the job. Then the Atomic Energy Commission gave Westinghouse the green light to undertake mass production on its own. The story of how the bottleneck was broken and high quality zirconium produced not by the pound but by the ton—in time to meet the need—wrote another chapter in the book of atomic-age engineering accomplishment.

Why the sudden demand for zirconium with such metals as steel, aluminum, copper and other metals at hand? Dr. W. E. Shoupp, director of development for the Westinghouse Atomic Power Division, explains it this way:

"For water-cooled nuclear reactors such as the Westinghouse submarine reactor, zirconium is one of the best materials that will work," he said. "Iron, steel, aluminum and the other metals of normal strength and permanence simply won't do at all."

Zirconium metal is lighter than steel. It has remarkable corrosion-resistance, an extremely high melting-point, and is a fine structural metal in that it is quite strong and workable. Most important for its use in a nuclear reactor is the fact that it does not "waste" neutrons—the atomic bullets that split uranium atoms and keep the atomic engine "running." Whereas some metals "absorb" these neutrons and thus interfere with atomic fission, zirconium offers no such interference.

"These qualities make zirconium only second perhaps in importance to uranium in the building of the submarine

reactor," Dr. Shoupp explained. "The urgency of this work, of course, has concentrated scientific attention on zirconium and the result has been astonishing."

## Startling Progress in Three Years

"More progress has been made in the development of zirconium within the last three years than was made during a whole generation in the development of iron and steel."

And why wasn't this Sleeping Beauty awakened long ago?

"Simply because it was extremely difficult to produce in pure form," Dr. Shoupp explained. "When none of the common metals met the requirements the hunt was on for something better."

The search led to the sandy beaches of Florida and Oregon strangely enough. Zirconium ore is found in the sands that wash ashore, not only in these two states but in many locations throughout the world. Zirconium is much more plentiful than uranium.

The problem, since zirconium first was discovered in 1789, has been how to produce the metal in pure form, free from many impurities with which it combines in nature. Several different processes were developed many years ago, but only to the point where small quantities of pure zirconium could be produced—and at a high cost.

The campaign to make zirconium a cheap, safe material for atomic energy work really began in 1948 when Capt. H. G. Rickover, looking forward to the days when the Navy would require zirconium for nuclear power plants on ships, threw Navy support behind the process development work then being carried out by the Bureau of Mines in Albany, Oregon. About this same time, the Atomic Energy Commission developed an interest and many of the AEC laboratories and contractors began studying and working with zirconium in earnest.

## Supply Urgently Needed

When the requirements for the submarine reactor became evident, however, there was no suitable supply of usable metal to meet the urgent manufacturing schedules. It was apparent that pieces of zirconium the thickness of a lead

pencil and costing \$250 a pound were not going to be sufficient. So it became necessary in July, 1950, for Westinghouse to step into the zirconium processing business.

Its scientists—headed by Dr. Z. M. Shapiro and Alexander Squire—frequently working more than 15 hours a day and usually seven days a week, set up a zirconium refining plant, staffed and in full production within 14 weeks. In that period production of pure zirconium "crystal bar" was boosted from several hundred pounds per month to thousands of pounds per month.

"We were able, through these efforts, to produce a zirconium metal of superior quality without which successful completion of our submarine reactor project was deemed impossible," Dr. Shoupp declared. "Equally important, was the fact that we also were able to produce sufficient quantity of the metal to do the job."

"We achieved quantity production of zirconium which is 99.9 per cent pure. Purity with respect to certain elements is the key to zirconium's resistance to corrosion and to the ductility—workability—of the metal."

Nothing was overlooked or left untied in the race to achieve high-quality, mass production of the vital metal, Dr. Shoupp related. At one step of the process, the scientists were momentarily stumped by the problem of how to achieve a sure, air-tight seal for various large metal caps and valves which operated at very high temperatures and had to be removed frequently.

"Several important steps in the process took place in large metal tanks" Dr. Shoupp said. "All air and gases had to be removed from these tanks. You might say we had to build vacuum tubes as tall as a man. No ordinary 'washer' or gasket that would stand up under extreme operating conditions could be used to seal off the caps and valves at the top of these tanks."

## Used Pure Gold As Seal

The material finally selected for use as gaskets to seal these openings was pure gold.

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"Pure gold," Dr. Shoupp explained, "was the cheapest, satisfactory material we could find. It is soft enough to make a perfect seal and stands up well under heat and corrosive conditions."

Unlike other possible materials, strands of gold wire were cheap for this purpose because they could be reprocessed after being used once, and again drawn into wire. Although costing \$35

an ounce at the start, the gold could be used over and over again.

The scientists devoted considerable time to the problem of making zirconium a corrosion-resistant as well as a cheap material for atomic power plant use. They explain that it is indeed a paradoxical metal. If handled properly it is a strong, stable and corrosion-resistant material. But if handled improperly, it is brittle, unworkable and corrodible. In

some forms it may also be inflammable.

If zirconium machining chips ignite, water is no help in quenching them. The hot zirconium combines with the oxygen from the water causing the zirconium to burn even more vigorously and to liberate hydrogen which also burns or may even explode in air. Strangely enough, however, one reason good zirconium is used in nuclear reactors is its great resistance to water even at the high temperatures involved.

### Helped End Fire Hazard

Before the fundamental secrets about this little-known metal were unfolded, fires were not infrequent. Westinghouse scientists and engineers did much to bring an end to these exploratory-stage hazards so that zirconium is now a useful metal.

Their zirconium production process began with what is called zirconium "sponge"—porous chunks of metal that look like coke. The sponge, produced by the Bureau of Mines at Albany, Oregon, is the result of a six-step reduction process that begins with the zirconium-bearing sands from the ocean beaches. While relatively pure, zirconium sponge still contained impurities which had to be removed before the metal could be used successfully in the first submarine nuclear reactor.

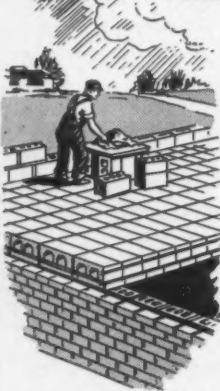
The sponge was loaded into a big tank which also held a container of zirconium tetra-iodide—a combination of zirconium and iodine. The "head" or top cover of the tank then was put in place; suspended from it was a series of hairpin-shaped zirconium wire filaments. After the tank was heated in a salt bath and evacuated of air and gases, electric current was passed through the zirconium wire. This started a chemical reaction.

The brick-red substance known as zirconium tetra-iodide vaporized and deposited pure zirconium on the hot wire filaments. The freed iodine then migrated back to the remaining sponge material and the cycle began once again until a considerable thickness of zirconium was deposited on the wire "hairpin." The hairpin was removed as a super-pure zirconium "crystal bar"—an irregular, many-sided bar which shines like silver.

These four-foot-long bars then were  
(Continued on Page 20)



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## Petroleum

(Continued from Page 4)

resin-laminated glass fiber. These bodies will not dent or rust, they are strong but light in weight and therefore save gasoline and cut down on tire wear. A similar material will be used for the fabrication of bath tubs. These will be particularly advantageous for use in trailers where weight is an important factor. The resin-glass fiber tubs weigh about 15 pounds compared to 150 pounds for enameled steel and 300 pounds for enameled cast iron tubs.

It is an interesting observation that the revolution in materials involves not only the use of entirely new substances but more advantageous utilization of such time-honored material as glass. While glass fibers are superior to metals and textiles for some purposes, plastics are replacing glass in some of its former uses. Polyethylene, for example, has many advantages over glass in bottles for cosmetics, pharmaceuticals and many chemicals. The polyethylene bottles are unbreakable, lighter in weight and resistant to most chemicals.

In the household, plastics have an extraordinary range of applications. It is believed that vinyl floor coverings will outlast the houses in which they are laid. Furthermore, these coverings need never be waxed or scrubbed and they do not stain or decompose from contact with grease. Plastics have also made vast inroads into the paint market. Replacing vegetable oils as base for paints to be used on interiors, they are easier to apply, eliminate odor, and dry more quickly. New packaging films made from polyethylene or Saran preserve food longer and are usable for some purposes such as deep-freezing for which the older type films were unsuitable. Plastics are also used in rust-proof screens, parts for radios and refrigerators, unbreakable dishes, decorative pieces and other household articles.

The industrial implications of plastic developments are far-reaching. One of the best examples is the replacement of sand molds by phenolic shell molds in foundries. The new shell molds produce castings with smoother, more accurate dimensions and require less machining than those from conventional molds. The lighter weight of shell molds makes pos-

sible the employment in foundries of persons having less physical strength than was previously necessary. Requirements for phenolic plastics for this purpose are expected to rise from a total of about 3 million pounds last year to 80 million within five years.

The new textile fibers are perhaps the most interesting of all of petrochemical-based products. Chemically, they are closely related to plastics and some of them could be classed in either category. In general, they have advantages over natural fibers in being stronger, faster drying, requiring little or no pressing, resisting deterioration from moths, mildew and chemicals. As a consequence, they require less care and wear longer. They are produced from raw materials which are not subject to the same natural factors as weather conditions, ravages of insects, and health of animals. As a result, everyone should some day be well clothed and housed in attractively decorated quarters.

The individual fibers vary in their applications and for some uses are blended with natural fibers. Nylon is well-known but additional uses are continually being found. One of the most dramatic is as material for armoured vests. Officials have credited these vests with reducing chest and abdominal wounds by 60 per cent in Korea. Another less known use of nylon is in rugs which will outwear wool by at least five times. They dye uniformly, can be matched while wool fibers vary, and can be cleaned with soap and water. Nylon, of course, is no panacea. Men's shirts, for example, were not too popular, but another fiber, Dacron, has since been developed for shirts and has in addition to the quick-drying advantages of nylon, better appearance, greater comfort, and no pressing requirements. Dacron is also being used both alone and in blends for suiting fabrics.

The acrylic fibers, Orlon, Dynel and Acrilan, are used principally as replacement for wool, either alone or in blends with wool, cotton or rayon, in such products as blankets, curtains, socks, shirts, work clothes, underwear, suitings, dresses and industrial fabrics. Acrilan has the greatest tensile strength and Orlon is the most resistant to atmospheric deterioration. Dynel is the most flame-resistant and for this reason over 13.5 miles of it were used for draperies,

blankets, bedspreads and trim on the new ocean liner, the *United States*.

The new vinyl yarns, Saran and Velon, have been used most extensively for auto seat covers. Recently, however, a wide variety of textile products ranging from rugs to clothing have been produced.

Closely related to synthetic textiles and plastics is synthetic rubber. The rubber industry as we know it today could not exist without petroleum as source material. The effect of petroleum-derived rubber has been to put the United States in a position of self-sufficiency in so far as rubber supplies are concerned. Continuous research is resulting in greatly improved types of rubber. The development of cold rubber, for example, has increased mileage of tires made from it by 25 per cent and has thereby saved the public about \$347 million during the past year. Many specialty rubbers have also been developed for inner tubes, heavy duty electrical insulation, hoses for gasoline pumps, self-sealing gas tanks, and other purposes. One of the most vital roles of petroleum products is in agricultural production which has been increased by the use of petroleum-fueled machines and such chemical products as fertilizers, insecticides, fungicides, growth-regulators, weed killers and defoliants. The impact which these innovations have had is illustrated by the radical change from 1910 when farm workers constituted 31.0 per cent of the labor force to 1952 when only 13.9 per cent were thus employed. The per acre yield of corn, our most important crop, has been raised over 35 per cent during this same period by the combined effects of mechanization, hybridization, and the use of chemicals. The application of the weed killer 2,4-D is a good illustration of the savings made. Weeds can be eliminated by the application of one pound of 2,4-D per acre and this operation takes only one hour with a tractor-drawn power sprayer as compared to 100 hours of manual weeding. It has been estimated that corn production could be raised as much as 50 per cent by more widespread use of chemicals. Wheat production likewise could be increased by as much as 30 per cent without any increase in labor requirements.

Cotton requires at present the largest proportion of farm labor of any major crop. The use of machines and chemicals,

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however, is being rapidly increased. Airplanes are now used to cover some large areas with insecticides, defoliants, and other chemicals. Total mechanization and "chemicalization" would, according to estimates, reduce the number of man-hours required to produce one bale of cotton from 155 to 10 hours.

Despite the widespread use of machinery and chemicals, it has been estimated that \$13 billion worth of crops are lost every year because of weeds, insects, fungi, and plant diseases. Petroleum will play a primary role in reducing this loss because it will be the major source of fuels for mechanization and chemicals for pest control.

These are but a few examples of the many products from petroleum. The myriad of chemical products, however, requires less than one per cent of the total U. S. oil production and about 5 per cent of the total natural gas production. The planned expansion of the industry assures ample supplies for expansion of present products and for manufacture of those which will be developed by our engineers and scientists.

This discussion of the impact of the petroleum industry has been limited to the United States, but its effects are world-wide. One of the most spectacular examples involves the use of a single petrochemical insecticide, aldrin, which is effective against such devastating pests as locusts, grasshoppers, and boll weevils. During 1951, Iran had its worst locust plague in 50 years and called on the United States for help. A team flew over from this country with supplies of aldrin and in four days time, the locust kill was 100 per cent and over 53,000 acres of crops were thereby saved. On a much broader scale, however, the United States petroleum industry carries out a privately financed point four program. Wherever our oil companies have operations, living conditions have been vastly improved, and good employment and educational opportunities have been made available to thousands of natives.

Fantastic as the achievements of the petroleum industry in the past may seem, they are only an indication of what is yet to come. The industry has the kind of faith in the future that has made America great and continues to hold even greater promise for our civilization.

## Washington Award

(Continued from Page 7)

Engineers is pleased to receive the recommendation of the Washington Award Commission and congratulates you on the selection of so deserving a recipient.

Dr. Gustav Egloff, the Western Society of Engineers, presents you with the Washington Award for 1953. In honoring you by publically calling attention to your achievements, as Mr. Alford wished, we noted with pride and appreciation that you also symbolize the spirit of service typifying the ideals of our society to which you have given long and diligent service. In recognition for distinguished leadership in petroleum research and development, professional activities, and in community services, I present you with this plaque commemorating this occasion. When in the future you look at it, we hope you will see reflected in it the smiling faces of your many friends all over the world who have benefited from your professional efforts and personal kindnesses.

After Dean Eshbach concluded his remarks, Dr. Egloff delivered his response, the full text of which appears on page 3 of this issue. Following this response, Mr. Sedwick returned to the lectern and adjourned the meeting.

*WSE Personals*

**Dr. Johan Bjorksten**, President of Bjorksten Research Laboratories, Inc., announces that Henry Tovey has been appointed senior literature chemist in charge of the Washington, D. C. Literature Research Branch of the Bjorksten Research Laboratories.

**James W. Perry**, who has been Director of Literature Research with the Bjorksten Research Laboratories, remains in the organization as a consultant, and also in charge of a Government-sponsored program for developing machine methods in searching and correlating scientific information.

**Lois A. Bey**, formerly with Underwriters' Laboratories, Inc., is now Assistant Engineer, Armour Research Foundation. She is a member of the Chemical and Metallurgical section. Miss Bey joined the Society in 1952.

**Edwin A. Hale**, formerly with Pace Associates, is now with Consoer, Townsend and Associates, 351 East Ohio Street, Chicago 11.

**Edward R. Ross**, formerly in busi-

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ness for himself in Indianapolis, is now with Management Construction and Engineering Associates, Hotel Astoria, 1 Rue de Presbourg, Paris (8e), France.

**Carl D. Wright** of Pacific Flush Tank Company was married on March 6 in Glencoe, Illinois, to **Miss Dorothy Lee Penrod**. They will be at home at 4950 Marine Drive in Chicago.

**H. P. Sedwick**, Past President of WSE, has been elected President of Public Service Company of Northern Illinois. Also, he was elected Executive Vice President of Commonwealth Edison Company. Mr. Sedwick will be President of the Public Service Division when the Public Service Company merges into the Edison Company.

**Charles A. Blessing**, formerly Director of Planning for the Chicago Plan Commission, is now Executive Director of the Detroit Planning Commission.

**John J. Ahearn**, Director of Fire Protection, and Safety Engineer at the Illinois Institute of Technology, was recently stricken with appendicitis while driving to Memphis. By coincidence, he became a patient in St. Anthony's hospital in Effingham, Illinois. Four years ago he had investigated the tragic fire at the same hospital.

**Lee M. Harris** is now Chief Home Appliance Engineer with General Mills, Inc., Mechanical Division, in Minneapolis. The address is 1620 Central Avenue. Formerly, Mr. Harris was Chief Engineer with Dominion Electric Corporation, Mansfield, Ohio.

**O. G. Smith**, Chief Engineer of the Illinois Bell Telephone Company, spoke before the American Association for the Advancement of Science at the association's 119th annual meeting held in St. Louis. Mr. Smith's talk, given during the symposium on Disaster Recovery, was entitled "The Re-establishment of Communications."

**Charles W. Walker** is now Area Construction Superintendent with the Illinois Bell Telephone Company at 208 West Washington Street in Chicago. Previously he had been Division Construction Superintendent with the company.

Announcement has been made by Soil Testing Services, Inc. of Chicago, Illinois, of the establishment as of January 15, 1953, of an associated firm, Soil Testing Services of Michigan, with of-

fices and laboratory in Portland, Michigan.

The newly organized affiliate is headed by Robert Torp-Smith, until recently with the Civil Engineer Corps of the U. S. Navy as Planning and Sea Bee Organizations officer in the Pacific Area, and under his direction the firm will specialize in soil mechanics and foundation problems, and subsurface explorations in the Michigan area.

Participants in the Michigan affiliate are **John P. Gnaedinger**, **Carl A. Metz**, and **Theodore W. Van Zelst** of Chicago, and Robert Torp-Smith of Michigan.

**Carl E. Schmitz** has recently been appointed Vice President in Charge of Sales for Crane Packing Company, Chicago, Ill., a manufacturer of mechanical packing, mechanical seals, Teflon parts, lapping machines and other products. He formerly held the position of Vice President and Director of Engineering.

In a reorganization of the Sales Dept. under Mr. Schmitz there are to be five Division Sales Managers: E. H. Stubenrauch, Mechanical Packings; Stephen Hawxhurst, Teflon Products; Harry I. Sole, Lapmaster; V. E. Vorhees, Mechanical Seals; and Stillman Segar, Plastic Lead Seal.

Mr. Schmitz joined the Crane Packing Company organization in 1942, where his duties have been with the Engineering Dept. Mr. Schmitz is well known throughout the Engineering Societies, being a member of twenty-two technical organizations and a former president of the American Society of Lubricating Engineers.

**Dr. Gustav Egloff**, after giving a series of lectures in Spain in December gave two talks in Paris. On January 12 he spoke before L'Association Francaise des Techniciens du Petrole on the subject of the "Impact of Petroleum on the Agricultural Industry." On January 13, he spoke before the French National Society of Engineers, on the subject, "The Modern Oil Industry."

On February 4 and 5, Dr. Egloff had two busy days between Kansas City and Independence, Missouri, under the auspices of the Oil Industry Information Committee, Missouri-Iowa-Nebraska District.

On the morning of February 4, at Independence, Mo., Dr. Egloff appeared on Radio Station KIMO, had press interviews with several newspapers in the

area, gave an address before the Optimists Club, and addressed a class or two of high school students.

Dr. Egloff left for Kansas City in the late afternoon, and had a press interview with the Kansas City Star, and then attended a private dinner with a small group of officers of the Kansas City sections of the American Chemical Society and the American Institute of Chemical Engineers, afterwards giving a technical address before members and guests of these societies, at Hoag Hall, University of Kansas City.

On the morning of February 5, Dr. Egloff met with students of the Kansas City School System at Radio Station KMBC and was interviewed on a program called "Youth Looks at the Future." He then addressed three or four chemistry classes, consisting of junior college and high school students at the Kansas City Junior College on "Synthetics."

In the afternoon of February 5 he gave an address before the members of the Missouri Petroleum Association, at the President Hotel, where they were holding their annual convention. The subject of his talk was "The Modern Oil Industry."

On February 27, Dr. Egloff presented a talk before the St. Louis section of the American Chemical Society on the subject, "The Platforming Process." In connection therewith, he was interviewed over Station KSD-TV at noon on February 26, and also over Radio Station KSD.

Dr. Egloff has been elected second vice president of the Chicago Post of the Society of American Military Engineers.

Of course, Dr. Egloff was recently honored at the annual Washington Award dinner.



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## Steam Plant

(Continued from Page 10)

will not tolerate delays caused by faulty equipment. This means that a steam generator when started at a terminal is expected to run continuously and automatically, regulating its steam output for the complete duration of the run

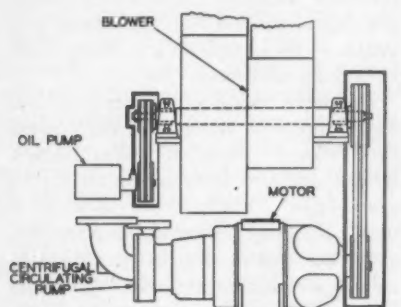


Figure 1

without any attention whatever from the crew in the cab. Thus, it is essential that a device of this nature must be absolutely reliable and fully automatic in operation.

At the present time, the steam generators with the recirculation feature are available in several sizes, the capacities of which are up to 6000 lbs. of steam

per hour. They are being built for operating pressures up to 300 lbs. per sq. in.

These steam generators will burn No. 5 oil as well as any of the lighter oils. They are also furnished for burning gas and for conversion from gas to any of the oils as well as from light oils to heavy oils, but no heavier than No. 5 oil.

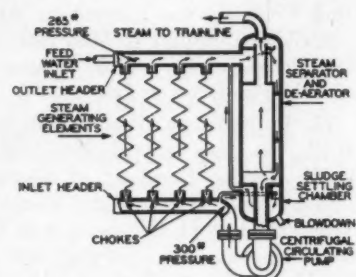
The figures which follow are based upon burning a light oil, namely diesel oil.

Fig. 1 shows diagrammatically a motor which runs continuously at constant speed all the time the steam generator is in operation. It shows a centrifugal circulating pump which is directly connected to the motor with a blower and oil pump operated by the motor thru the media of belts.

The motor is operated at constant speed regardless of the amount of steam output. Therefore, the centrifugal pump, the blower, and the oil pump are operated at constant speeds at all times.

Fig. 2 shows diagrammatically the controlled recirculation principle used. It should be noted that a centrifugal circulating pump is used solely for recirculation purposes and is in addition to a feed pump. The feed pump, as the name implies, is used to supply the amount of makeup feed required to equal the steam output. Fig. 2 also

shows that the constant speed centrifugal pump takes water from the bottom of the steam separator and deaerator and discharges it into an inlet header. This water is within two or three de-



CONTROLLED RECIRCULATION FLOW DIAGRAM

Figure 2

grees of boiler temperature. The inlet header feeds a number of steam generating circuits or elements. This arrangement is, therefore, quite different from the "once-thru" or the "one-thru spill-over" types previously described, since they have but one circuit. The word "circuit," as referred to here, is intended to mean a length of several feet of tubing in which water enters at one end, and steam and water are discharged from the other end. There are from seven to twelve such circuits in each of the various sizes of our steam generators.

At the entrance to each circuit is a choke which acts as a metering orifice. The pressure drop thru this orifice or choke is considerably greater than the pressure drop thru the tubing. This insures a proper distribution of water thru all circuits.

Note the difference in pressure in the inlet and outlet headers. This difference in pressure insures satisfactory circulation. A valve, known as a differential valve, is connected to both the inlet and outlet headers. It is operated by the difference in these pressures. When the difference in these pressures is not sufficient to insure satisfactory circulation, the differential valve automatically closes off the fuel supply.

This figure also shows that all of the steam generating circuits discharge into an outlet header, and it should be kept in mind the mixture discharged into this header by the tubes at maximum steam output is ten times as much water by weight as steam. When the steam generator is operating at one-half capacity, this ratio of water to steam becomes approximately twenty to one and

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when operating at one-quarter capacity the ratio becomes forty to one.

One should note from this figure that the makeup feedwater enters the system at the outlet header. It is while traveling to the steam separator and deaerator that the makeup feedwater is heated to boiler temperature. Preheating of the makeup feed speeds up tremendously the action of the internal chemical water treatment, liberates the air and gases from the makeup feedwater and provides a uniform temperature throughout the system, thus simplifying expansion problems. Deaeration takes place in the steam separator where the steam rises to the steamline and the water drops to the bottom of the separator. Air and the gases pass out of the separator with the steam.

In Fig. 2 it will be seen that a sludge settling chamber is built into the bottom of the steam separator to provide a constant filtering process which is in operation all the time the steam generator is in use. The function of this sludge settling chamber is in no way related to the functions of the steam separator and is merely built into the steam separator for structural convenience. A small amount of water from the circulating pump discharge is constantly entering the sludge settling chamber. Because of the low velocity flow thru this chamber, an appreciable quantity of the sludge settles to the bottom and the clean water from the top of the sludge settling chamber re-enters the circulating system. The sludge from the sludge settling chamber is blown to atmosphere periodically. A continuous blowdown, manually adjusted, is provided to reduce the total dissolved solids.

When the stop button is pressed to shut down the steam generator, the burners shut off but the motor, and therefore the circulating pump, continue to run until the steam pressure drops to approximately 50 lbs. when the motor automatically shuts down. This insures that the heat in the refractory brick in the bottom of the steam generator has been dissipated and all steam generation has ceased before recirculation stops. This operation also provides a thorough hot water wash for the circuits each time the steam generator is shut down.

With this type of controlled recirculation steam generator, the necessity of maintaining a water level higher than

the steam generating surface is removed since the circulating pump takes care of insuring proper circulation thru all of the circuits. Because the circulating pump handles water at practically boiler temperature, it is essential that this pump be fed with water having a certain minimum head. The water level which is maintained provides ample head to prevent the occurrence of flashing in the suction portion of the circulating pump.

The control of the feedwater is shown in Fig. 3. Makeup feed is fed to the boiler by a steam-operated duplex double-acting reciprocating pump. The control consists simply of a float-operated steam valve. During operation, the water level is maintained at the float level. As the water level drops, the float moves downward and increases the amount of steam to the feed pump. This increases the amount of water fed to the steam generator. As the water level rises the reverse takes place. There is no packing in the valve which regulates the steam flow to the pump. Variations in friction which would have a detrimental affect on the performance of the valve are thus avoided.

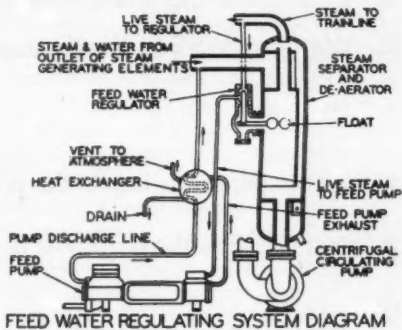


Figure 3

The exhaust steam from the feed pump passes thru a heat exchanger where it gives up most of its heat to the feedwater. The condensate from this steam is discharged to the drain because it contains lubricating oil from the pump steam cylinders.

Fig. 4 shows the fuel oil and combustion air system. As previously stated, the constant speed motor operates the blower and oil pump at constant speeds. The oil pump discharge line has a relief valve which permits the excess oil to be returned to the oil tank. This valve maintains a constant pressure in the pump discharge line. However, the oil

cannot reach the burner until the solenoid valves have been opened. The solenoid valves are electrically opened and closed.

The burners shown for light oils are of the mechanical atomizing type and no air or steam is mixed with the fuel oil prior to its atomization. The amount of oil burned is dependent upon the oil pressure at the burner tip.

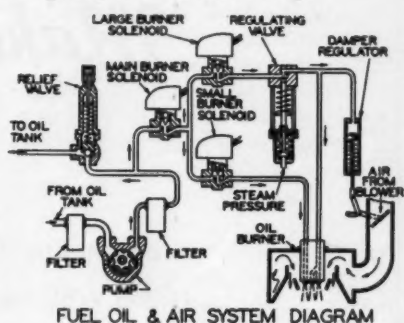


Figure 4

The main burner solenoid valve opens automatically when the differential valve establishes that the water circulation is satisfactory.

The next solenoid valve to open, when starting, is the one to the small burner. This is an "all on" or "all off" burner operated by a pressure limit switch. The small burner is capable of generating approximately 800 lbs. of steam per hour. The fuel to the large burner is regulated by a valve acting in response to steam pressure on a bellows. Drawing steam from the generator tends to lower the steam pressure. As the steam pressure drops, the pressure of oil to the large burner is increased. Conversely, as the steam pressure increases the pressure of oil to the large burner is decreased. In this way, the proper amount of oil is automatically burned to maintain the desired steam  
(Continued on Page 19)

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HENRY COFFMAN, Chairman

LEE BIRD, Assistant Chairman

Membership Committee

## Steam Plant

(Continued from Page 17)

pressure which is between 265 lbs. and 275 lbs. gauge pressure. Referring further to Fig. 4 it will be noted the oil pressure to the large burner actuates a spring-opposed piston which in turn actuates the air damper. The damper regulates the amount of air admitted to the burner. Thus, the proper amount of air is admitted to the burner to give satisfactory combustion.

When starting the steam generator, the control switch is set in the Starting position and the Start button is pressed. This starts the motor which in turn operates the circulating pump, the blower and the oil pump. At this point the operator checks the water level in the glass and if more water is required he opens a valve in the house line to bring the water level to the top of the water glass. He then moves the control switch down to the Running position.

Since the motor has been running for a few minutes, the blower has already purged the steam generator of any gases which may have been present in the combustion chamber. An automatic time delay feature is provided so that at least a five second purge period will exist before ignition takes place, thus insuring against a flare back.

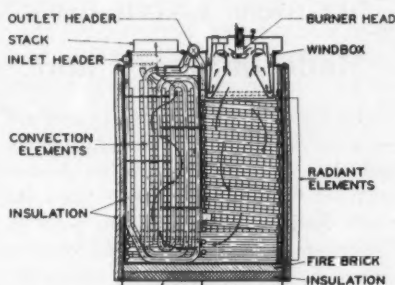
When the control switch is moved to the "Running" position, an electric spark is provided for ignition. The fuel oil solenoid valve in the small burner pipe line then opens, and ignition of the oil takes place. If, after five seconds, the electric eye has not seen a flame and taken over control to keep the fuel oil solenoid valve open, the latter will automatically close. If, however, the electric eye has seen the flame, it permits the fuel oil solenoid valve to remain open. The electric spark continues for a period of five seconds after which it automatically discontinues. The solenoid valve in the large burner pipe line then opens, and this burner is ignited by the flame from the small burner.

The small and the large burners remain in operation at maximum capacity until full boiler pressure is reached. When starting cold, this takes approximately three minutes.

Fig. 5 shows a section thru the steam generator. The burner cone has no refractory. The alloy plates used in it are air-cooled by the air flowing to the

burner. This figure shows the path of flow of gases from the combustion chamber to the stack. It will be noted that the gases travel thru a fairly long path with suitable baffling to provide efficient heat transfer.

Steam generator body castings are now being made so that two of the side walls can be removed to enable removal of the steam generating surface horizontally where there is insufficient head room to lift this surface vertically. It is only necessary to remove one of these panels to remove the steam generating surface.



SECTION THRU STEAM GENERATOR

Figure 5

The steam generator is furnished as a complete package with all of the auxiliaries. To keep to a minimum the amount of work required in the field for installation, as many of the auxiliaries as possible are attached directly to the steam generator. Thus, there is a considerable saving in labor in the field where such labor is not only prohibitively expensive, but frequently inefficient.

The compactness of the units have in many instances avoided high building costs by being able to utilize a small existing space in plants or reducing to a very appreciable extent the space that is required in a new building. In fact, we have had cases where, comparing the cost of providing building space for a natural circulation boiler with that required for these steam generators, the saving in building cost much more than covered the cost of the steam generator. We have at the present time in service and on order a total of almost 400 steam generators. They are being used by railroads, institutions such as hospitals, schools, colleges, and in a great number of industries. There has been a wide acceptance of this steam generator and many repeat orders have been received.

## Crerar Library Notes and News

A review of departmental reports shows an active acquisitions program for 1952. *These are New*, the bi-weekly announcement of new titles acquired for the Technology Department, lists more than 250 periodicals and other serial publications which were added to the subscriptions for the department during 1952. Many of these were titles which began publication during the year. A selection of these shows the variety of new titles of interest to engineers:

*Advances in Geophysics*

*La Fonderie Italiana*

*Direct Current*

*Instrument Engineer*

*Crerar Metals Abstracts*

*Wire Review*

*Bureau of Ships Journal*

*Annual Review of Nuclear Science*

Bound volumes added to the cataloged collections during 1952 numbered 7,328, of which 1,187 volumes were in physics and chemistry, 838 volumes were in other basic sciences, and 1,535 were in the various branches of engineering.

The process of selecting books and periodicals, both new and old, requires the cooperative effort of staff members in all divisions of the Library. The principal source of recommendations for engineering publications is the reference staff of the Technology Department, with participation also by technical staff in Research Information Service. The review sections in a large number of technical periodicals are scanned regularly for appropriate new titles. An important potential source of recommendations is the reader who uses the Library. Not many suggestions come from this source, but all are welcome and most are acted upon favorably.

The Acquisitions Department on the 11th floor also plays an important role in the program. New announcements are routed to appropriate staff members for consideration and all recommendations for purchase are screened against the Library's acquisitions policy. This department is also active in seeking gifts for the collections and in administering the exchange program with other scholarly organizations in this country and abroad.

## Zirconium

(Continued from Page 12)

rolled, chopped into small pieces and melted down into ingots. The ingots themselves eventually were forged and rolled.

Today, the value and safety of zirconium now are proven and the complicated processes for making it are well enough known that it no longer is necessary to produce it in laboratories and pilot plants. Today it no longer need be carried to the "crystal bar" stage. Thanks to the ingenuity and hard work of many scientists and engineers, ways for using the cheaper zirconium sponge have been discovered. Future reactors will be built from zirconium sponge, so operation of the crystal bar plant is no longer necessary.

The AEC recently announced that it had given a five-year order for zirconium sponge to the Carborundum Metals Company at a unit price of less than \$15 per pound. Although the quantity of

zirconium to be produced is small when compared to the tonnage of iron and aluminum made, the fact that reactor-grade zirconium now is to be produced in industrial plants instead of laboratories, as was originally the case, is definite evidence that it has passed the "Sleeping Beauty" stage and is a thoroughly awakened member of the great family of metals available to American industry.

## Stainless Extrusions Made in Gary Plant

Hot billets of tough stainless steel are rammed through dies to produce tubes and shapes in a new extrusion department at United States Steel Corporation's National Tube Division plant in Gary, Indiana. Glass in various forms is melted by the process to act as a high-temperature lubricant for the dies. The new unit, employing the French Ugine-Sejournet process for the hot extrusion of metals, consists of a 2,500-ton hydraulic press and related facilities.

The press is capable of producing seamless tubing  $1\frac{1}{2}$  inches to  $6\frac{1}{4}$  inches, outside diameter. With present tooling, the maximum size extruded is  $5\frac{1}{8}$  inches. Wall thicknesses vary with the size of the tube. Annual capacity of the new unit will depend on the weight of the billets charged and the type of product being extruded. At full production and with a favorable product mix, it is estimated the press will turn out more than 2,000 tons a month.

Using the new facilities, the Gary plant can now produce tubing from non-pierceable grades of stainless steel. It can also extrude unusual shapes that cannot be rolled because of their unbalanced design.

Steel billets for the process are supplied by other U. S. Steel mills and arrive in the form of rough-turned and surface-conditioned rounds. These are stored outside the mill in a 6,350 square yard area. They are moved as needed to an indoor storage area where they are weighed before being cut into extrusion slugs.

The cutting is done by four circular saws and there is provision for a future

installation of four more. Each saw is serviced by an overhead jib crane. After cutting, the slugs are weighed and in some cases the leading end is chamfered.

For production of small tubing of stainless steel the slugs must be drilled. This is done on a vertical drill, inverted to permit the spilling of drill chips. Enough slugs are prepared and stored to fill each order specification.

To make it possible to handle the slugs by overhead conveyor, a specially headed flux-filled stud is welded to the end of each slug by a semi-automatic electric-arc process. Alloy-steel cast hangers, designed to withstand severe and repeated thermal shocks, are suspended from an overhead conveyor similar to those used on automobile assembly lines. The stud is engaged by a slot in the hanger and the conveyor moves the suspended slug into the heating furnace.

This is a 3-zone, gas-heated furnace with a slotted roof to permit passage of the necks of the hangers. The furnace can produce maximum temperatures of 2,400 degrees Fahrenheit.

From the furnace the conveyor carries the slug to a barium-chloride salt bath where temperatures up to 2,300 degrees Fahrenheit may be maintained.

Extruding temperatures vary with the type of stainless steel being used but the average is around 2,250 degrees Fahrenheit. Slugs are heated in the gas furnace to nearly final extrusion temperature before transferring to salt bath.

The salt bath completes the heating of the slug and coats the billet and reduces any surface scale which has formed. An exhaust and ventilation system protects employees from fumes and excessive heat.

After leaving the barium-chloride salt pot, the heated slug is conveyed to a charging buggy. Here the welded stud is severed with an air-driven chisel. The slug drops onto the press charging buggy, which positions the billet in the press. A sheet of glass fiber is placed on the table and wraps around the slug as it rolls into position before the extrusion press.

The press itself is prepared in advance for each extrusion. The die is placed in position and the slug case

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packed with sandwiches of various thicknesses of woven, pane, spun or other forms of glass, depending on the type of extrusion and the composition of the steel. The face of the ram is protected by a removable steel disc called the "dummy block." In extruding tubes, the major product of the National Tube Division, a mandrel, projecting thru and beyond the ram, is covered with a glass-fiber stocking.

In some cases it is possible to use the mandrel as a piercing tool, eliminating the need for drilling the slugs beforehand. This practice is limited to large-diameter tubes because of the structural strength limitations of the mandrel.

A special air cylinder on the charging buggy inserts the prepared slug into a heavy, circular steel section known as the "container." A spacer piece is lowered before the face of the container, the ram is advanced and pressure is applied. Heat and pressure reduce the glass to a viscous liquid which serves as a lubricant as the steel is forced through the die.

The main ram is powered by a 2,000-ton hydraulic cylinder and the piercing mandrel by one of 500 tons, providing a total available force of 2,500 tons.

Power for the press and auxiliary equipment is transmitted through a closed hydraulic system using a solution of city water and soluble oil as fluid. A pre-fill tank of 1,200 gallons and gravity tank of 6,800 gallons provide a total fluid capacity of 8,000 gallons.

There are two hydro-pneumatic accumulator systems, each with a maximum pressure capacity of 3,900 pounds per square inch, or 300 pounds over the maximum operating pressure requirements of 3,600 pounds.

An air compressor, with 4,000 pounds per square inch maximum capacity, is provided for charging and recharging air to the accumulators.

After the slug has been extruded there remains in the container the unextruded portion, or butt. This is usually less than  $\frac{3}{4}$  inch long. The container is shifted away from the die approximately 4 inches. This draws part of the extruded tube back through the die and provides space for a high-speed circular saw to cut the butt from the tubing.

The container is advanced again to push the severed tube onto an outlet conveyor. The butt is then pressed from the container by the rammer. It falls into a chute which conveys it to an operator who removes the butt from the dummy block by a hydraulic squeezing mechanism. Butts are recovered for scrap, the dummy blocks for re-use.

The extruded product leaves the die by means of an outlet conveyor. This is followed by a table from which the product can be dropped into a water-quench tank or onto an air-cooling rack. After either quenching or air cooling, the product is weighed and inspected.

At present, some shapes have a tendency to twist as they leave the die. After cooling and inspection, these are moved to a stretch straightener where such objectional characteristics are corrected.

Glass and oxides adhering to extruded tubes are removed by a bath in a special pickle solution. After rinsing, the tubes are ready for further processing—either tube reducing or cold drawing.

The dies in the extrusion press become thinly glazed after each operation and must be cleaned before re-use. Thus, three dies must be used in cycle: one in the press, one being cleaned and one in reserve. The container is also cleaned with a rotary brush after each extrusion.

The press and its auxiliaries are fully instrumented and all controls are automatic.

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## Sections Nominate

The Nominating Committees of the Sections listed below have nominated two members each as the regular ticket for Directors of their Section. The terms will be for three years beginning June 1, 1953.

Nominees for the Bridge and Structural Engineering Section for the election to be held on April 20:

Floyd K. Goodell, Senior Structural Engineer, American Bridge Company.

Richard J. Rasmussen, Structural Designer, Vern E. Alden Company.

Nominees for the Chemical and Metallurgical Engineering Section for the election to be held on April 13:

Harry P. Hagedorn, Engineer of Tests, City of Chicago, Testing and Inspection Division.

B. M. Kostenko, Metallurgist and Office Manager, Sueske Brass and Copper Company.

Nominees for the Communications Engineering Section for the election to be held on April 2:

Theodore H. Cole, Vice President in Charge of Engineering, Western Railroad Supply Company.

Francis G. Varenhorst, General Coordinator, Illinois Bell Telephone Company.

Nominees for the Hydraulic, Sanitary and Municipal Engineering Section for the election to be held May 25:

Frank W. Edwards, Director, Department of Civil Engineering, Illinois Institute of Technology.

C. J. McLean, Hydraulic Engineer, Public Service Company of Northern Illinois.

## Harvey H. Jordan to be Honored Soon

Associate Dean Harvey H. Jordan of the University of Illinois college of engineering will be honored May 15 at a dinner attended by university and college officials, alumni, faculty, students, and representatives of industrial concerns. He retires this summer after 42 years of service.

He has held his present position since 1934, having been assistant dean for the preceding 17 years. He was head of the department of general engineering drawing from 1922 till 1949.

Master of ceremonies for the May 15 dinner will be Professor Randolph P. Hoelscher, Dean Jordan's successor as department head. On behalf of close friends and associates, he will present personal gifts to Dean and Mrs. Jordan.

Dean Everitt will present to the University of Illinois the H. H. Jordan Award Fund, income from which will be used to honor scholastic excellence in the college of engineering. The award will be accepted by President George D. Stoddard. The fund has been collected by a committee headed by Assistant Dean Stanley H. Pierce, with Assistant Dean Wendell Miller as treasurer.

Other speakers at the dinner will be Clyde Young, president of the engineering undergraduate council and Charles A. Davis of Moline, Ill. Mr. Davis

speaks in a dual role, both as chairman of the college of engineering alumni committee and as a representative of the many industries with which Dean Jordan has worked closely in his capacity as engineering placement director.

Dean Jordan was born in Waltham, Maine, on March 7, 1885, and graduated from the state university in 1910. He has been with the University of Illinois since 1911. He has served as vice-president of the American Society for Engineering Education and on its executive council, has been active in many engineering societies and fraternities, was an alderman of the city of Urbana for six years, and is co-author of books on engineering drawing and descriptive geometry.

## Obituaries

**Lawrence G. Parker**, the Western Society has just been informed, died on November 24, 1952. Mr. Parker became a member in 1928, and was a Structural Engineer.

He is survived by his widow.

**Frederick W. Fisher**, a Life member of the Western Society of Engineers since 1922, died on August 3, 1952.

Mr. Fisher was an Architect and Structural Engineer.

He joined the Society in 1889.

The Society has just learned of the death on November 27, 1952, of **Wil-**

**liam Ryer Wright**. Mr. Wright had been a member of the Society since 1922, and a Life member since May, 1952.

During the years from 1939 to 1942 he served as a member of the Finance Committee. In 1946-47, he was a Director of the Chemical and Metallurgical Engineering Section.

His widow survives him.

**Harold J. Thompson**, a member since 1950, died on January 27, 1953. Mr. Thompson had been a Representative for the Hooper-Green Company.

**Elmer W. Coffey**, a member of the Society since 1945, died on February 18, 1953. Mr. Coffey had been a Consulting Engineer in La Grange, Illinois.

**Herbert R. Clarke**, La Grange, Illinois, formerly Chief Engineer, Chicago, Burlington and Quincy Railroad, died on February 18, 1953.

Mr. Clarke became a member of the Western Society in 1943.

He is survived by his widow, Nora, and daughters Helen Keough of Downers Grove, Illinois and Gertrude Shade of Maplewood, New Jersey.

**Norman J. Richards**, a Life member of the Western Society of Engineers since 1949, died on February 19, 1953. Before retiring, Mr. Richards had worked for Public Service Company of Northern Illinois in Joliet, Illinois.

Mr. Richards was born in Cohoctah, Michigan, on February 19, 1887, and was graduated from the University of Michigan with a degree in Electrical Engineering in 1911. He joined the Commonwealth Edison Company in 1914, and later transferred to the Public Service Company, where he became Assistant District Superintendent in Oak Park, in 1917. In 1923 he moved to Joliet as District Engineer, and thereafter became District Operating Superintendent, and later Division Operating Foreman, which position he held at the time of his retirement.

**John R. Smith**, a member of the Society since 1945, died in his home in Glencoe, Illinois, on March 2, 1953. Private services were held for him.

Mr. Smith had been a Representative for the Sorgel Electric Company. From 1945 until 1947, he had served on the Education and the Library Committees of the Society.

Surviving is his widow, Elsie, a son, John, Jr., and two daughters Mrs. Fred Lemke and Elaine.

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# Reviews of Technical Books

## Los Alamos Techniques

*Miscellaneous Physical and Chemical Techniques of the Los Alamos Project.* Edited by Alvin C. Graves and Darol K. Froman, McGraw-Hill Book Company, New York 36, N. Y. First Edition 1952. 323 pages. \$4.00.

The contents of this book represent declassified material which was originally included in Volume 3 of Division V, Los Alamos Project of the Manhattan Project. The first volume was entitled "Electronics," the second, "Ionization Chambers and Counters," the third, which is the subject of this review, "Experimental Techniques."

This volume is concerned with Preparation of Foils, Neutron Sources, The Modulated Betatron, Modulation Techniques, and Optical Methods and Instruments. The various experimental techniques relative to the above topics are discussed.

This volume should be valuable as a reference to a research chemist or physicist interested in atomic and nuclear energy investigations.

R.G.O., W.S.E.

## Indeterminate Structures

*Statically Indeterminate Structures*, by Chu-Kai Wang, McGraw-Hill Book Company, New York 36, N. Y. First edition 1953. 424 pages. Price \$7.50.

This book is written for senior and first year graduate students in civil engineering. Treatment is given to the structural analysis of statically indeterminate beams, rigid frames and trusses by the methods of consistent deformation, three moment equation, slope deflection, moment distribution and column analogy. The text also deals with the analysis of fixed arches, secondary stresses in trusses with rigid joints and composite structures.

This book is one in a field that has already been covered by many texts. In order to be of any value it must have something special, something unique, that cannot be found in other texts. It meets this requirement on several scores.

(1) Many illustrative examples completely worked out in detail.

(2) 178 exercise problems with answers.

(3) Suggested tabulations in solution of problems are helpful. This is particularly true for moment distribution.

(4) The procedure for checking moment distribution for continuity.

B.A.W., W.S.E.

## Practical Calculus

*Practical Calculus*, by Claude E. Stout, McGraw-Hill Book Company, New York 36, N. Y. Second Edition 1952. 469 pages. \$6.00.

The book is a revised second edition originally written by C. I. Palmer.

All of the topics usually covered in a first course in differential and integral calculus are treated. The fundamental principles of the calculus with many illustrations and analogies are repeated to assist the student in his learning. Those who find that repetition is a good way to relearn a subject will be impressed with this elementary treatment of the calculus.

A number of problems with practical applications are included in each chapter.

This is an excellent text for one who wishes to study the calculus at home without the aid of an instructor. It should also be a valuable reference text for college students in the beginning course in calculus and for refresher study for those who have taken calculus and may have forgotten much of the subject.

R.G.O., W.S.E.

## Metallurgy

*Metallurgy for Engineers*, by John Wulff, Howard F. Taylor, and Amos J. Shaler, John Wiley & Sons, Inc., New York, N. Y. First Edition, 1952. 624 pages. \$6.75.

This book was written as a text for the non-metallurgical engineering student. The first part of the book with many questions at the end of each chapter serves as preparation material on the subject for class recitation. The latter part of the book may be used as a basis for laboratory work.

The principles necessary to give a non-metallurgical engineer information to choose the proper metals for a particular project is ably presented in clear and concise statements. Sufficient information for the understanding of the processing of metals into useful articles by welding, casting, and working is included.

A summary at the end of each chapter serves as an aid to the student in his preparation for quizzes.

This text may also be used by the practicing engineer as a review of those topics in metallurgy which he may have forgotten.

R.G.O., W.S.E.

## Educational Sub-Committee to Publish Letters

Young Engineer, what does your employer think of you? Does he feel that you're doing an adequate or superior job? Or does he feel that you have certain deficiencies which should be corrected?

To find out, Charles A. Blessing, while Chairman of the Educational Committee, appointed a sub-committee which sent out a letter to the presidents of 52 concerns who employ engineers in the Chicago area. The letter was sent to companies in various industrial pursuits in order to get a cross-section of small, medium and large concerns. Of the 52 inquiries sent out, 30 final replies were received.

As the sub-committee says, "the . . . letters speak eloquently for themselves and should be studied carefully by anyone interested in this matter . . ." The sub-committee has summarized the outstanding points of the letters, however, so that much of the benefit may be had at once.

The summary says:

"1. Employers generally are satisfied with the technical training being given in the colleges—broader than 20 to 30 years ago—concentrated on fundamentals, leaving detailed specialized training to industry which is as it should be—colleges are doing a good job of preparing young engineers technically for industry.

"2. While engineers understand technical matters well, they need training to enable them to express themselves

clearly and concisely—both orally and in written reports. When dealing with the laity, engineers should learn to express themselves as simply as possible.

"3. In order to advance into management ranks, engineers need grooming in the fields of social sciences and the humanities. Such training is a life-long process and can not be picked up in a short course on effective development.

"4. Specific mention is made of such subjects as liberal arts, finance, history, salesmanship, engineering cost studies, psychology, marketing, motivation, enthusiasm, initiative, business administration, drive, business sense and human relations. Of these, without doubt, the most important is thorough training and constant attention in the matter of human relations. This thought is the medium on which all other constructive suggestions are launched by the industrial leaders in the Chicagoland area. In this connection it is extremely gratifying to know that the human relations course, developed by the Bell System and taught by two Illinois Bell instructors to 42 WSE members during a Spring term, seems to fit the specifications of the industrial leaders and proved very popular with the participants."

The text of the letter which was originally sent out is as follows:

"Dear Mr. \_\_\_\_\_:

"For several years the Western Society of Engineers has been giving in-

creased attention to the educational needs of its members, particularly from the standpoint of what they may need to equip themselves as supervisors in engineering work and ultimately to advance into executive positions.

"In order to sharpen our focus on the problem we are attempting, among other approaches, to ascertain the viewpoint of industrial leaders on deficiencies they see in engineers in their employ.

"Therefore we would welcome a frank discussion of this problem based on your personal views as well as those of your personnel and engineering department heads. Please consider individual qualities such as personality, cultural development, and business sense as well as the technical development of the individual.

"Representatives of the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, and the Illinois Engineering Council have agreed that the Western Society should carry forward this program for the benefit of all engineers in the Chicagoland area.

"If it is convenient for you to do so, we would appreciate having you forward your reply not later than October 15, 1951.

Very truly yours,  
Donald N. Becker, President  
Western Society of Engineers"

In each issue of *Midwest Engineer*, one or more of the replies will be published. It is hoped that not only young engineers, but all engineers will benefit from reading the replies.

Here is the first answer to the letter, to be published:

"Dear Mr. Becker:

"Your letter of August 31, solicited our opinion on the educational needs of engineers to better equip them for advancement to executive positions. We have some opinions and information on this subject which may be helpful to you.

"A few years ago at the request of a large university which was revising its curriculum, the . . . Company made a study of desired characteristics of college Graduate Engineers with a view towards

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suggesting changes in courses of study. While the requirements of . . . Company supervisory positions were studied in an effort to determine the characteristics of college graduates best suited to fill them, the conclusions regarding the college courses needed to develop able men were sufficiently general as to be applicable to most engineers. The conclusions were that most engineers have been given sufficient technical training in their undergraduate work with the exception of those who wish to go into research and development work or some very specialized field. Graduate study is highly desirable in such cases. This study did suggest that more emphasis on effective writing and speaking would be desirable; so would some study of the humanities, social science, accounting, statistics and labor relations. It also pointed out that competent and inspiring teaching is of paramount importance in the success of such courses for engineers.

"We feel that there have been improvements in the college curriculum in recent years so that the engineers' education is broader than it used to be. But continued study through adult education classes and through selected reading is desirable in developing engineers for supervisory and executive positions. While we think that most of the emphasis to overcome deficiencies on the part of engineers should be in non-technical studies and in activities, we also feel that it is important that he keep well informed on contemporary technical advancements in the field of his specialization.

"In participation in a program of classes and activities it is evident that a broadening advantage to the engineer is inherent in association in class with non-engineers as would be the case at most of the evening colleges in the city. On the other hand, special classes or activities for engineers only, may be the extra inducement which stimulates participation and overrides the many other demands on his leisure time.

"We are pleased to have the privilege of expressing ourselves on this matter and hope that our suggestions may prove useful. May I say in closing that I personally feel that this is a very good work and I wish you much success in it."

## E.S.P.S. Committee Installs Officers

The Chicago Advisory Committee of the Engineering Societies Personnel Service, Inc., installed their new officers for 1953 at a meeting on March 3 at the Headquarters of the Western Society of Engineers.

Virgil E. Gunlock is now Chairman. He is Commissioner of Public Works for the City of Chicago, and the representative of the Illinois Society of Professional Engineers, of which he is Junior Past State President.

Vice Chairman is Lemuel Dunlap who is the representative of the American Institute of Electrical Engineers and Director of Professional Training for the Westinghouse Electric Company in Chicago.

Treasurer is E.S.P.S.'s Junior Past Chairman, J. N. Stanbury, who represents the Western Society of Engineers and is Vice President of the Illinois Bell Telephone Company.

Bonnell H. Allen, who is the Chicago Manager of the Engineering Societies Personnel Service, Inc., is Secretary.

The installing officer, Alfred H. Meyer, the Executive Director of Engineering Societies Personnel Service, Inc., from New York, had the assistance of the Past Chairman, John Seifried, of Ceco Steel Company and Dean Ovid W. Eshbach of Northwestern University's Technological Institute.

Among the prominent engineering personalities present were Eugene Bailey, Chairman of the Chicago Section of the American Society of Mechanical Engineers and associated with the Commonwealth Edison Company. Also, Roger O'Connor, Chairman of the Chicago Section of the American Institute of Electrical Engineers and associated with the Illinois Bell Telephone Company; and Frank W. Edwards, Chairman of the Chicago Section of the American Society of Civil Engineers and from the Illinois Institute of Technology. Mr. Edwards will be remembered in engineering circles for his work in coordinating the recent Centennial of Engineering held in Chicago. Also present was John Dolio, President of the Chicago Chapter of the Illinois Society of Professional Engineers and of John Dolio, Consulting Engineers; and Clayton G. Ball, Chairman of the Chicago

Section of the American Institute of Metallurgical and Mining Engineers and of Paul Weir Company.

Other members of the Committee present were Dr. Carl Samans, retiring from the Committee, as representative of the American Institute of Metallurgical and Mining Engineers, in the research department of the Standard Oil Company of Indiana, who was succeeded by Dr. Otto Zmaskel, from the Illinois Institute of Technology; A. L. R. Sanders, representing the American Society of Civil Engineers and General Manager of Hazlet and Erdal, Consulting Engineers; J. Earl Harrington, Executive Secretary of the Western Society of Engineers, and Major Adolph Langsner of Northwestern University Technology Institute who is also very prominent in consulting circles and who represents the American Society of Mechanical Engineers.

The Engineering Societies Personnel Service Inc., is a non-profit corporation founded in 1918 which handles all of the personnel work for nine of the country's leading National and Local engineering societies on a National basis with offices in Chicago, Detroit, New York and San Francisco.

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# == WSE Applications ==

In accordance with the By-Laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions,

and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office. The Secretary's office is located at 84 East Randolph Street. The telephone number is RAndolph 6-1736.

100-52 Robert W. Richards, Manufacturer's Representative, 80 E. Jackson Blvd.

101-52 Verner L. Lane, Junior Engineer, Illinois Central Railroad Co., 135 E. 11th Pl.

102-52 Verne A. Soderstrom, Senior Construction Engr., Chicago Housing Authority, 608 S. Dearborn St.

103-52 Erskine G. Roberts, Prof. Engineer, E. G. Roberts & Associates, 2621 N. Capitol Av., Indianapolis, Ind.

104-52 Edwin H. Armstrong, Prof. of Elect. Engrg., Columbia University, 116th St. & Broadway, New York, N.Y.

105-52 Arthur W. Consoer, Executive Partner; Consoer, Townsend & Associates, 351 E. Ohio St.

106-52 Ralph G. Michael, Designer "B", Chicago & Western Indiana Railroad — Belt Railway Co., 47 W. Polk St.

107-52 Sumner S. Sollitt, President, Sumner S. Sollitt Construction Co., 307 N. Michigan Av.

108-52 Kenneth G. Cook, Junior Engineer; DeLeuw, Cather & Co., 150 N. Wacker Dr.

109-52 Clarence R. Bruckner, Chief Engineer, Sidney Wanzer & Sons, Inc., 130 W. Garfield Blvd.

110-52 Maurice E. Robertson, Engineer, Jefferson Electric Co., 25th at Madison St., Bellwood, Ill.

111-52 Paul R. Sidler, President, Brown Boveri Corp., 19 Rector St., New York 6, N.Y.

112-52 Hubert C. Rett, TV Engineer, National Broadcasting Co., Merchandise Mart.

113-52 Marguerite F. Huff, General Contractor, 110 E. Bellevue Pl.

114-52 Frank E. Kimmel, Materials Handling Engr., Western Electric Co., Hawthorne Works.

115-52 Louis Rammel (Rein.), Chief Draftsman, J. F. Pritchard & Co., 221 N. LaSalle St.

116-52 Wilbert A. Kalk, Engineer, Bucyrus-Erie, 941 Kilpatrick Av.

117-52 John W. James, Vice President-Research, McDonnell & Miller, Inc., 3500 N. Spaulding Av.

118-52 George M. Arnold (Rein.), Sales Engineer, Cutler-Hammer, Inc., 400 W. Madison St.

119-52 George P. Cole, General Engrg. Design Head, Blaw-Knox Co., Chemical Plants Div., 180 N. Wabash Av.

120-52 Earl B. Jensen, Machine Designer, Motorola, Inc., 4545 W. Augusta Blvd.

121-52 Frederick D. Beck, Project Engineer, Blaw-Knox Co., 180 N. Wabash Av.

122-52 Thomas J. Mullin, Jr., Assistant to Chief Engineer, Celotex Corp., 205 W. Monroe St.

123-52 Kelly J. Scuderi, Squad Supervisor, Freyn Engrg. Dept. of Koppers, 109 N. Wabash Av.

124-52 James W. Simpson, 1110-16 E. Broad St., Columbus, Ohio.

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# Armour Research Foundation to Expand Burma Institute

Armour Research Foundation of Illinois Institute of Technology has just signed a three-year contract to reorganize and expand the State Industrial Research Institute of Burma in Rangoon. Signing of the contract was announced February 20 by Dr. Haldon A. Leedy, director of the Foundation.

Dr. Christopher E. Barthel, Jr., assistant director at the Foundation, will serve as resident director of the Burmese Institute, Dr. Leedy said. P.B.W. Gollong, International division supervisor at the Foundation, will fly to Burma shortly to make arrangements for Dr. Barthel's arrival.

"The principal objectives will be to train scientists, engineers, and technicians, and set up research and development programs on industrialization of agricultural products, the use of indigenous raw materials, and metallurgy," Dr. Leedy explained.

The Burmese Institute is quartered on the campus of Rangoon University. Its current work deals with the development of paper, construction materials, and the commercial extraction of antimony from native ores.

One of Dr. Barthel's first tasks will be to work with the Burmese to establish immediate and long-range training, research, and development programs to meet the technological, industrial, and economic needs of the country. Ultimately, the Burmese plan is to erect a modern research facility on a 35-acre tract in Rangoon.

"The Burmese Institute will be backed by the experience and services of Armour Research Foundation," Dr. Leedy said. "It is likely that Foundation specialists will be called upon to assist Dr. Barthel, and should the need arise, research for Burma will also be carried on in the Foundation's laboratories in Chicago."

The new research center in Rangoon will conduct confidential research and development projects for Burma's industries, carry out government-sponsored research, offer technological advice and assistance for modernization

of industries, and pursue fundamental research problems.

A pioneer in the export of U. S. technological "know-how," Armour Research Foundation helped the Bank of Mexico establish the Mexican Institute of Technological Research in 1944, and has been associated with its operation since that time. Thomas P. Collier manages the International division's far-flung operations in Mexico, the Caribbean, South America, India, Pakistan, and Burma.

The contract between Armour Research Foundation and the government of the Union of Burma was made in cooperation with the U. S. Technical Cooperation Administration, a government agency.

## Radio Interference Conference to Meet

Engineers, management and technicians of all firms whose products may in any way cause radio interference are invited to the Mississippi Valley Radio Interference Conference to be held in the theatre of the Museum of Science and Industry in Chicago on April 7 and 8. The invitation comes from the Supervising Inspector of Naval Material and the Inspector of Naval Material, Chicago, hosts for the conference.

The program for April 7 consists of a general meeting addressed by speakers familiar with the Navy's needs and specifications. It will be followed by a discussion of radio interference measurement equipment and shielded test enclosures. During this technical discussion of instruments, a group will be formed to discuss management problems.

On April 8, discussion groups will review specific phases of the program. The subjects for review are:

Morning—1. Radio transmitters and receivers. 2 Motors, generators and switching problems. 3. Electro-medical, electronic heating and electric welders. 4. Office equipment, commercial ap-

pliances, oil burners, galley equipment and lighting.

Afternoon—5. Radar. 6. Computers, communication terminal equipment and test equipment. 7. Internal combustion engines and equipment incorporating engines. 8. Other, as may be requested.

## Jet Fuel Damages at Fields Not Serious

Under normal operating conditions, there is no serious damage from heat, blast or fuel spillage from jet aircraft on airport pavements, the Spring Convention of the American Society of Civil Engineers, meeting in San Francisco, was assured on March 4.

The word "normal," however, was strongly emphasized by the speaker, Gayle McFadden, of Washington, D.C. Mr. McFadden is Chief of the Airfield Branch, Engineering Division, Office Chief of Engineers of the Army.

"We find there is no serious damage to either portland cement concrete or bituminous type pavements from heat and blast under normal operating conditions of these aircraft," said Mr. McFadden. "There is no question that jet aircraft with characteristics different from these may be harmful to pavements."

As to the effect of fuel spillage, Mr. McFadden said:

"This again is dependent on the characteristics inherent in the design of the jet motor which controls the amount of normal spillage. In discussing the effect of fuel spillage, we must emphasize the amount of normal spillage. Under these conditions we do not find any significant damage to either the joint sealing materials in concrete pavements

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(Continued from Page 27)

or to the surface of bituminous pavements."

Tests by the Army in collaboration with the Air Force were begun, he said, in the latter part of 1951. Summarizing the conclusions, Mr. McFadden said:

"The degree of the effect of jet aircraft on airfield pavements, both from heat and blast and from fuel spillage, is directly related to the characteristics of the aircraft.

"Portland cement pavements are not affected by jet aircraft except for damage done to the joint sealing material. Certain joint sealing materials now being manufactured as 'jet-resistant' are affected by heat and blast but are to a large extent resistant to fuel spillage. They are generally satisfactory to the operation of most jet aircraft.

"Inspection of asphaltic pavements and investigations of the effect of jet aircraft on their performance indicate that (a) well designed and well constructed dense-graded hot-mix asphaltic concrete pavements resist satisfactorily both the heat and blast and the fuel spillage of most airplanes under normal operating conditions, (b) old dense-graded hot-mix asphaltic concrete pavements are more resistant to jet fuel spillage than newly constructed pavements, and (c) thin surface treatments are not satisfactory for sealing porous pavements against fuel spillage."

## EUSEC Sets Date for European Meet

Dates for the second international conference on engineering education to be held in Europe will be September 27-October 2, 1954, if recommendations recently passed at the first conference are accepted, reports Dean Willis R. Woolrich of the University of Texas. The recommendations go to "EUSEC"—the International Committee on Engineering Education of the United States and the European Council of Engineering Societies.

Dean Woolrich attended the January 12-17 EUSEC conference in London as the president and official representative of the American Society for Engineering Education. Other North American representatives were Dean Thorndike Saville, chairman of the Engineers Council for Professional Development committee on engineering college accreditation, and Colonel L. F. Grant of Canada, ECPD chairman. Three practicing engineers and engineering educators likewise represented each of nine other nations—Norway, Sweden, Denmark, Belgium, the Netherlands, France, Switzerland, Italy and Great Britain. The hosts were the Institutions of Civil, Mechanical and Electrical Engineering of Great Britain.

"We Americans have much to give Great Britain and Western Europe," President Woolrich reports, "from our sixty years' experience in the conduct and analysis of engineering education. In turn, we can learn much from their many patterns of engineering education, which have been specially designed to

meet the needs of highly industrialized regions."

He continued:

"The success of any Atlantic confederation necessarily relies to a great extent on the cooperation of its scientific and engineering personnel. Under present circumstances, with so large a flow of students to the United States, we Americans must have an informed interest in engineering education beyond the Atlantic—in its philosophy, its minimum standards, and its quality. Three thousand graduate students come to the United States each year for advanced work, a high percentage of them in order to take engineering.

"The six days of our London sessions, twelve hours a day, ironed out many misconceptions as to the status and education of engineers in the countries represented. We developed a greatly increased appreciation of each other's problems and achievements.

"We spent considerable time defining educational and engineering terms that differ widely in meaning from country to country. Our sessions made it plain that the development of a standard international terminology for engineering education is highly desirable."

## Builder Club Elects

The Builders' Club of Chicago unanimously reelected Harry A. Thompson, Sr., of Harry A. Thompson, Inc., as President, at the annual meeting held recently in Chicago.

Elected to other offices were: Bertram A. Weber, architect, first vice-president; Lawrence G. Hallberg, of Engineering Systems, second vice-president; and Arthur T. Moulding, of Thomas Moulding Brick Co., treasurer.

Saling I. Kaufman was named as a director for two years. Elected to three year terms as directors were: Harry A. Clark of Consumers Co., B. B. Hurd of B-H Elec. Co., Harold H. Lundberg of Wadeford Elec. Co., Parker J. Montague of Montague Const. Co., and Joseph W. Moulding, Jr., of Thos. Moulding Brick Co.

At a later meeting, the Board of Directors reappointed Lora A. Paul as the Executive Secretary.

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## Waste Furnace Heat to be Used by Boiler

Plans to recover vital copper in one of the richest undeveloped deposits on the North American continent called for a specially designed boiler to utilize what would otherwise be waste heat from a copper reverberatory furnace. The boiler, designed and being built by The Babcock & Wilcox Company, will supply steam to a turbo-generator to furnish power for the projected development.

The scene of this spectacular operation is the White Pine copper smelter 18 miles southwest of Ontonagon, Michigan. Explorations conducted over the past 15 years by the Copper Range Company of Boston determined there is a sufficient ore body to produce copper for the next 50 years. The company, at the request of the DMPA and assisted by an RFC loan of 57 million, is currently constructing the necessary facilities to recover, process and ship fire-refined copper from the site. This work is being done by the White Pine Copper Company, a wholly owned subsidiary of Copper Range.

The ore mineral is mainly chalcocite, a cuprous sulfide. The total ore reserves amount to 309 million tons averaging 21.3 pounds of copper per ton.

### Boiler of Special Design

The boiler, which will be about six stories high, is to be in line with and following the reverberatory furnace in which the copper ore is melted.

The gases or products of combustion, heavily laden with slag particles and dust, leave the reverberatory furnace at a rate of approximately 143,000 pounds per hour at a temperature of 2600 degrees Fahrenheit, entering, first, the waste heat boiler furnace, then, passing through the superheater and convection section of the boiler.

The hot slag particles will fuse on any surface with which they come in contact, especially if the surface is hot. To cope with this problem the waste heat boiler was specially designed with tube-to-tube water-cooled wall radiation chamber, widely spaced platten-filled chamber and superheater chamber, and a cross-flow convection boiler section.

The heat absorption of the water-cooled furnace walls and the water-

cooled platens reduces the temperature of the incoming gases 400 to 500 degrees Fahrenheit before they enter the superheater chamber. Thus, the suspended slag particles are cooled to a dry ash which drops to the furnace hopper and into the hoppers under the boiler from which it is returned to the reverberatory furnace for retreatment to reclaim the copper.

The parallel, instead of the usual staggered, tube arrangement makes cleaning more effective. This is accomplished by automatic telescopic soot blowers, located in lanes between the platens, superheater and boiler convection sections, periodically blowing high pressure steam through nozzles across the boiler.

This arrangement prevents slag accretion on tubes which would otherwise necessitate hand lancing, a time-consuming and expensive operation. Aside from the considerable time and expense saved, this arrangement insures continuous operation of the boiler.

To minimize draft loss and insure against sulfurous gases leaking into the boiler from where men work, there will be a single-pass horizontal cross gas flow arrangement from the reverberatory furnace outlet through the waste heat boiler and to the balloon flue inlet.

### Valuable "Waste Heat"

Using this waste heat from the reverberatory furnace instead of fuel for the generation of steam, the waste heat boiler recovers about 50 percent of heat in the fuel originally supplied to the reverberatory furnace.

The boiler is designed to generate steam at 885 pounds per square inch at a temperature of 920 degrees Fahrenheit at the superheater outlet. The steam generated is used not only in the power plant, but a portion is used to preheat combustion air, by means of steam air heaters, for the copper reverberatory furnace.

At such times as the reverberatory furnace may be shut down for repairs, the boiler, by a special arrangement, can be fired with pulverized coal, thus assuring continuous full production of steam at all times.

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(Continued from Page 29)

also be installed. There are three pulverizers, two of which will normally be used to fire the reverberatory furnace. The third, through a system of interconnected piping, will serve as a standby unit to insure uninterrupted operation and will also intermittently supply pulverized coal to a storage system. Pulverized coal from this storage system will be used to fire a holding furnace, a refining furnace and a copper converter.

An innovation in the smelting industry is the completely automatic control system which will permit firing of the reverberatory furnace from a central control center. From the same push-button panel engineers can operate the waste heat boiler, coal pulverizers, raw coal conveyors and the pulverized coal distributing system.

## Seed Drive Begins For Philippine Aid

The fourth annual nation-wide SEEDS FOR DEMOCRACY drive asking Americans to contribute vegetable seeds for distribution throughout the Philippine Islands was launched March 23 by the American Women's Voluntary Services in cooperation with the Committee for Free Asia.

Participation of the many U.S. Units of the AWVS and its thousands of American women volunteers will be under the direction of Mrs. Louis Lengfeld, President of the California AWVS and National First Vice President. Mrs. Lengfeld stated that complete cooperation and support is promised by the national AWVS and its Units throughout the country. The drive will continue through September 21.

Purpose of the drive, Mrs. Lengfeld explained, is to collect millions of vegetable seeds which the Committee for Free Asia will distribute without charge to the people of the Philippine Islands.

"Because of climatic conditions," Mrs. Lengfeld said, "vegetable seed does not reproduce well in the Philippines. Importation is costly and, as a result, the diet of many Filipinos is deficient in fresh vegetables."

Since the start of the first SEEDS FOR DEMOCRACY drive in 1950, Americans in all of the forty-eight states have contributed more than 2,000,000 individual packets of vegetable seeds, all of which have been distributed among Filipino farmers, school children and families for planting in home gardens.

"This self-help program," Mrs. Lengfeld declared, "is a simple and inexpensive way of extending the American tradition of friendship a third of the way around the world to the people of the Philippines."

"Conducted on a person to person basis, the SEEDS FOR DEMOCRACY drive is now looked upon by Americans as a fine way of expressing their belief in individual initiative."

"Sent with the contributions of vegetable seeds are planting instructions. To help raise his own living standards, the Filipino recipient must contribute his own labor and gardening care."

"The Filipino who plants and cultivates these seeds from the U.S.," Mrs. Lengfeld continued, "has a daily reminder of the interest Americans have for the problems and welfare of the people of other nations."

Eight varieties of vegetable seeds are sought. They are: Bush, pole and soy beans, cabbage, Chinese cabbage, tomato, mustard, egg plant, peas, squash, and watermelon.

Seed packets may be mailed in any container which meets U.S. postal regulations for domestic mail and may be addressed simply to: SEEDS FOR DEMOCRACY, San Francisco, California.

The AWVS will seek support for the 1953 drive from other organizations such as the Boys' Clubs of America, Boy Scouts and Girl Scouts, Chambers of Commerce, garden clubs, Church societies and other groups and individuals.

One of the hundreds of letters received last year from Philippine recipients who successfully grew SEEDS FOR DEMOCRACY was from a Church group supervisor who wrote the Committee for Free Asia:

"This program hits at the very heart of the fight against communism. To grow more food on one's own bit of land is the hope of all Asia."

## Engineering Societies Personnel Service, Inc.

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*These items are from information furnished by the Engineering Societies Personnel Service, Inc., Chicago. This SERVICE, operated on a co-operative, non-profit basis, is sponsored by the Western Society of Engineers and the national societies of Civil, Electrical, Mechanical and Mining and Metallurgical Engineers. Apply to ESPS, Chicago and the key number indicated. Prepared ENGINEERS AVAILABLE advertisements limited to 40 words, with typed resume attached may be submitted to ESPS Chicago by members of Western Society of Engineers at no charge.*

### OVER THE MANAGER'S DESK

March is usually a turbulent month with things in general reacting to unsettled weather. Our thoughts ramble from the March Hare and the Mad Hatter, St. Patrick and the snakes and the roar of the March Lion to the meekness and tranquillity of the Lamb. Do not let your engineering needs suffer by these reactions and ramblings.

If you need engineering talent for your company or if you are unsettled in your employment as an engineer, get in touch with E.S.P.S. and see if we can help you turn your problem into one which will be as gentle as the Lamb and as satisfactory as St. Pat's fete was to the Irish. B.H.A.

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R-9671 ASSISTANT MANAGER. Age: 30-40. 3 plus yrs. exp. in valves and preferably aircraft valves. Knowledge of hydraulics. Duties: assistant to manager of valve department covering design development, testing, some production. Will consider a younger man whom we can train. For a manufacturer of valves. Salary: \$500-\$600. Employer will pay fee. Western Suburb.

R-9670 JUNIOR DRAFTSMAN. Age 21 and up. Some board work on small mechanical parts. Knowledge of gears or transmissions helpful. Duties: drafting, detailing and layout of shop prints. For a manufacturer of gears. Salary \$80 per week. Employer will pay fee. Location: Chicago.

R-9669 PRODUCT DESIGNER. ME Age: up to 35. 3 plus yrs. exp. in designing products for mass production such as appliances or devices. Knowledge of materials and production equip. Duties: solve unusual problems of product design, do board work and calculate stresses and strains of materials for mass production. Industrial designers company. Salary: \$7000-\$9000 per yr. Employer will negotiate fee. Loc.: Chicago.

T-9668 ACCOUNTANT-ENGINEER. Age: up to 60. Some exp. in utility records and procedures as prescribed by regulatory authorities, together with considerable electrical engineering exper. Duties: reclassification and determination of original cost of electric plant when first devoted to public use to be developed from accounting and other available records. For a utility. Salary: \$398.50 to \$521.50 per month. Loc.: Ohio.

T-9666 PROJECT ENGINEER. Age: 35-50. 1 plus yrs. exp. in plant layout on shell lines for ordnance plants. Knowledge of production sequence. Duties: layout production line for shell loading plants, will have to do own board work. For a manufacturer. Salary: \$500-\$600 per month. Employer might negotiate fee. Location: Chicago.

R-9665 MANAGER — INDUSTRIAL DIVISION. Engrg. degree. Age: 33 yrs. up. 3 yrs. exp. in instrument or regulating valve sales. Knowledge of instrumentation. Duties: manager division of sales department covering industrial controls. For a manufacturer of controls. Salary: \$8500 per yr. Car required. Location: Illinois.

T-9664 INSPECTOR. 4 yrs. college. Age: 23-28. 1 yr. exp. inspector of all trades in new construction and appurtenances of buildings for owner. Duties: as indicated above plus checking of contractors accounts for owner of buildings. Small amount of drawing board work also required. For industrial foods company. Salary: \$5000-\$6000. Location: Iowa.

R-9663 DESIGNER and DRAFTSMAN. Duties: work in consulting engineer's office on reinforced concrete and structural steel design and drafting on commercial and industrial buildings. Salary: Open. Employer might negotiate fee. Loc.: Chicago.

T-9662(b) RADAR ENGR. EE or PHYSICIST. 6 yrs. exp. in application of pulse technique to radar system design. Assume engineering responsibilities for solution of radar pulse circuitry problems, including modulator design. Salary: \$6500-\$9500 per year. Location: New York.

*If placed in a position as a result of an Engineers Available or Position Available advertisement, applicants agree to pay the established placement fee. These rates are available on request and are sufficient to maintain an effective non-profit personnel service. A weekly bulletin of positions open is available to subscribers. Apply ESPS Chicago.*

### ENGINEERS AVAILABLE

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ESTIMATING or SUPVN. ME 29. Four yrs. estimate labor and material for bids, purchase material and equipment and plan jobs with shop supt. and field foreman. \$7000 Midwest 573 MW.

CONST. SUPT. CE 27. Three yrs, personal charge of design, estimating, specification writing and field supervision of construction \$7200 Chicago 574 MW.

FIELD ENGINEER CE 35. Five mos. administrative, estimating and sales. Seven yrs. office and field engineering doing design and construction of highways and structures. \$7500 Chicago 575 MW.

CONSULTING IND. ENG. 27. One yr. six mos. mgmt. consultant. Analyze mfg. problems and procedures, job evaluation, production control, accounting procedures, layout and install wage incentives. One yr. compile standard data on welding, grinding and machining operations. \$6000 Chicago 576 MW.

PLANT MGR. 38. Ten yrs. Ind. Engr. doing job analysis, employee training, supervisory training labor and cost standards, prod. control, plt. supervision, plant layout, production and cost estimating. \$7500 Midwest 577 MW.

FACTORY MGR. ME 28. Three yrs. works manager. Set up plant, established operational procedures, designed equipment and supervised constr. and installation of new equip. One yr. design and layout work under works engr. \$7200 Midwest 578 MW.

IND. ENGR. BUS. ADM. 39. Five yrs. special research on plant problems as cartage, testing, equipment and supplies, methods and standards. \$6000 United States 579 MW.

DEVELOPMENT EE 29. Eighteen mos. trainee in Elec. Testing Lab. on mining machinery. Five mos. drafting of electrical equipment for newly constructed project and aided in designing of transformer vault. \$4320 Midwest 580 MW.

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## To Hold Exhibition of Stained Windows

The First comprehensive Exposition of Religious Articles and of Stained Windows from France will be held in the Century Room of the Hotel La Salle in Chicago from May 4th to May 7th 1953. Sponsored by the French Commercial Attaché, this exhibition will give Architects, among others, a unique occasion to see selected samples of the work made by craftsmen trained in the best traditions of the builders and decorators of the great churches for which France is so justly famous.

Among the objects that will be shown are Chalices, Ciborias and Bishops Appointments in Bronze and in Silver; Chasubles, Copes and Tapestries; Stations of the Cross in precious metal, in enamel and in carved Wood; Medals of Bronze and of Silver; Prayer books and Missals; and some wrought iron ornaments.

In another section will be a colorful display of stained glass windows, both in the old tradition of leaded glass and in the modern technique of heavy blocks of brilliantly colored glass imbedded in cement.

The following well known craftsmen will be present at the Exhibition to greet the visitors and give all the technical information that may be requested: Mr.

Franck Bauer of Le Vitrail Francais, Mr. Max Ingrand, Mr. Francis Chigot, Mr. Blanchet.

The Exhibition will be open from 10 a.m. to 6 p.m. For information, call the French Commercial Attaché, ANdover 3-6067.

## What's Your Value?

When and where was a good cook considered worth two scientists? In 1850 in California.

"Inflation, in certain fields, fixed worth on the basis of two scientists for a cook, a little more than a century ago."

Thus, said Lansing G. Simmons, of the U. S. Coast and Geodetic Survey, in a recent talk before the Spring Convention of the American Society of Civil Engineers in San Francisco, the heavy influx due to the gold discovery in 1849 made it the Survey's duty to provide for navigation safety by charting the coast and harbors. George Davidson, an assistant in the Survey, arrived in San Francisco in 1850 for that purpose.

"He received \$800 a year and provided his own board," said Mr. Simmons. "A cook on the same payroll received \$125 a month with all traveling and subsistence provided. It would seem that at that time and place a good cook was considered worth more than two good scientists!"

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**schedule**



Top, Dining Room  
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Right, Large Auditorium

Monday night meetings are planned specifically for the members' interest. They keep members up-to-date with the improvements and discoveries in their fields. Wednesday noon luncheons are held each Wednesday from 12:15 to 1:30 p.m. Members and guests receive an excellent meal, hear a stimulating speaker, and join in good fellowship. For reservations call RA 6-1736.

## Headquarters of The Western Society of Engineers

- *Relax in the lounge*
- *Meet your friends*
- *Lunch leisurely*
- *Dine with the family*
- *Use the lounge and dining room for your parties*
- *Luncheon- 11:30 a.m. - 2 p.m.*
- *Dinner- 5:30 p.m. - 8 p.m.*

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